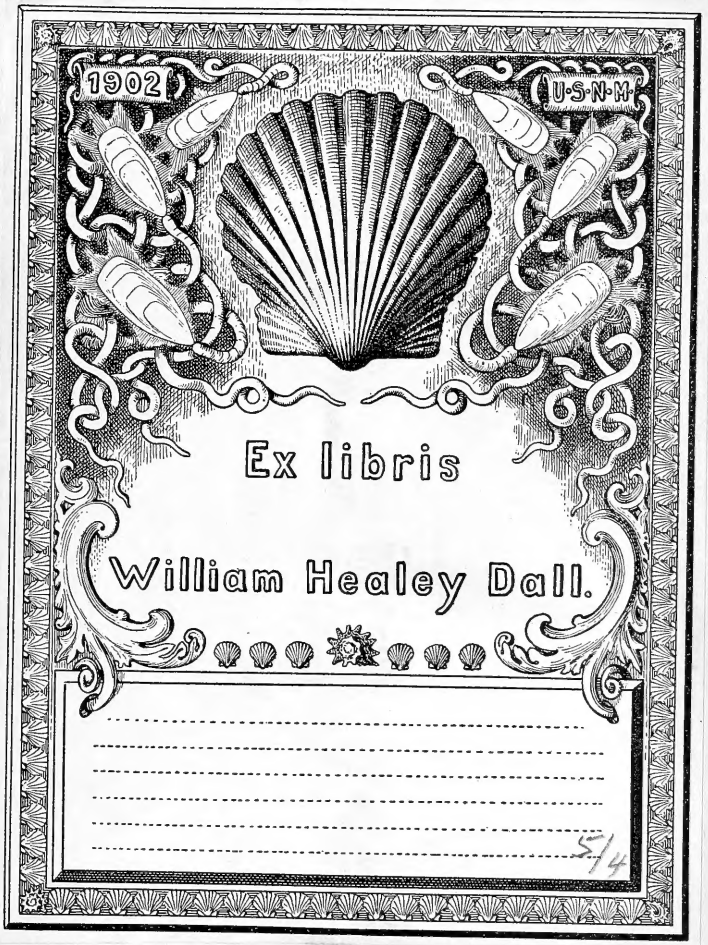
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THE

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EDITED, UNDER THE DIRECTION OF THE COUNCIL,

BY

WILLIAM E. HOYLE.

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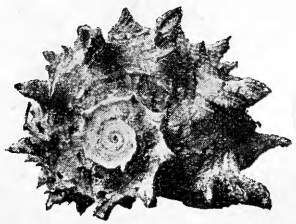

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The portrait of J. C. H. Crosse is intended to be placed as a frontispiece to the volume.

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THE

JOURNAL

OF

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1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford.
1895. Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., The Owens College, Manchester.
1893. Hill, John, Little Eaton, near Derby.
1886. Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
1888. Hodgson, (Mrs.) Julia, Chalgrave Vicarage, Leighton Buzzard, Bedfordshire.
1886. Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.
1891. Horsley, Rev. J. W., St. Peter's Rectory, Walworth, London, S.E.
1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.
1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.S.A., etc., Bentcliffe House, Eccles, Manchester.
1886. Hoyle, W. E., M.A., M.Sc., M.R.C.S., F.R.S.E., Keeper of the Manchester Museum, Owens College, Manchester.
1895. Hudson, Rev. Hy. A., 1, Johnson Street, Cheetham, Manchester.

1886. James, John H., A.R.I.Cornwall, 3, Truro Vean Terr., Truro, Cornwall.
1891. Jenner, James Herbert Augustus, F.E.S., 4, East Street, Lewes.
1894. Jones, Kenneth Hurlstone, St. Bride's Rectory, Old Trafford, Manchester.
1888. Jones, Wm. Jas., jun., 76, Mayes Road, Woodgreen, London, N.
1889. Jordan, H. K., F.G.S., The Knoll, Clytha Park, Newport, Monmouthshire.

1897. Kendig, Rev. Amos B., D.D., 86, Vernon Str.. Brookline, Mass., U.S.A.

1897. Kennard, A. S. Berrenden, Mackenzie Road, Beckenham, Kent.
1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
1887. Kew, H. Wallis, F.Z.S., 157, Ferme Park Rd., Hornsey, London, N.
1895. Killingbeck, J. H., Didsbury, near Manchester.
1889. Knight, Rev. G. A. Frank, M.A., Almanarre, Gareloch Head, N.B.
1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
1894. Lawson, Peter, 11, The Broadway, Walham Green, London, S.W.
1892. Layard, Edgar Leopold, C.M.G., F.Z.S., etc., Otterbourne, Budleigh Salterton, South Devon.
1878. Leicester, Alfd., Buckhurst Farm, near Edenbridge, Kent.
1889. Linter, (Miss) J. E., Arragon Close, Twickenham, Middlesex.
1896. Linton, John, 25, Wordsworth Road, Smallheath, Birmingham.
1897. Loddee, Miss Mary, Lonah, Ulverstone, Tasmania.
1895. Loydell, A., 19, Chaucer Road, Acton, London, W.
1891. Lyons, Lady, Admiralty House, Devonport.
1889. MacAndrews, James J., Lukesland, Ivy Bridge, Devonshire.
1885. McKean, Kenneth, F.L.S., Lloyds, London, E.C.
1886. McMurtrie, Rev. John, M.A., D.D., 5, Inverleith Place, Edinburgh.
1884. Madison, James, 167, Bradford Street, Birmingham.
1885. Marquand, Ernest D., Fermain House, Guernsey.
1887. Marshall, J. T., Sevenoaks, Torquay, Devonshire.
1887. Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
1888. Mason, Philip Brooke, J.P., M.R.C.S., F.L.S., F.Z.S., Trent House, Burton-on-Trent.
1897. May, William Lewis, F.R.S. Tasm., Forest Hill, Sandford, Tasmania.
1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
1880. Melvill, James Cosmo, M.A., F.L.S., Brook House, Prestwich, Manchester.
1891. Middleton, Robert, Gledhow, near Leeds.
1888. Milne, J. Grafton, Mansfield House, Canning Town, London, E.
1879. Milnes, Rev. Herbert, M.A., The Friars, Priory St., Cheltenham.
1891. Mitchell, James, 240, Darnley Street, Pollokshields, Glasgow.
1891. Morris, Cecil Herbert, Lewes, Sussex.
1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.
1887. Newstead, A. H. L., B.A., Roseacre, Epping.
1891. Newton, Richard Bullen, F.G.S., 7, Melrose Gardens, West Kensington Park, London, W.
1891. Norman, Rev. Canon Alfred Merle, D.C.L., F.R.S., F.L.S., etc., Houghton-le-Spring, Durham.
1887. Oldham, Charles, Sale, Cheshire.
1896. Overton, Harry, Brookdale, Tudor Hill, Sutton Coldfield, Warwickshire.
1882. Parke, George H., F.L.S., F.G.S., St. John's, Wakefield.
1887. Parry, Lieut.-Col. G. S., 18, Hyde Gardens, Eastbourne, Sussex.
1898. Partridge, F. J., 11, Duchess Road, Edgbaston, Birmingham.
1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock, Oxfordshire.
1896. Percival, A. Blayney, Somerset Court, Brent Knoll, Somerset.
1896. Phillips, Robert Albert, Ashburton, Cork.
1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
1895. Powell, (Mrs.) A., Nant-y-Velin, Criccieth, N. Wales.
1897. Preston, Hugh Berthon, The Manor House, Berrow, nr. Burnham, Somerset
1888. Radcliffe, John, 111, Oxford Street, Ashton-under-Lyne.

1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
1897. Rawson, Sir W. Rawson, K.C.M.G., C.B., 68, Cornwall Gardens, London, S.W.
1887. Reader, Thomas W., F.G.S., 171, Hemingford Rd., Barnsbury, London, N.
1896. Rhodes, John, F.E.S., 360, Blackburn Road, Accrington.
O Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
1886. Rogers, Thomas, 27, Oldham Road, Manchester.
1893. Roseburgh, John, 54, Market Street, Galashiels.
1892. Rosevear, John Burman, 113, New King's Rd., Fulham, London, S.W.

1877. Scharff, Robert F., Ph.D., B.Sc., M.R.I.A., Curator of the Natural History Museum, Dublin; Tudor House, Dundrum, Dublin.
1893. Scharff, W. E., c/o Edwards, Scharff & Co., Bradford.
1895. Schill, C. H., Broome House, Didsbury, near Manchester.
1886. Scott, Thomas, F.L.S., 14, Lorne Street, Leith, N.B.
1893. Shackleford, Rev. Lewis John, 14, Edna Street, Crumpsall.
1892. Shillito, John G., 20, Elmore Road, Sheffield.
1895. Sich, Alfred, F.E.S., Brentwood, 65, Barrowgate, Chiswick, Middlesex.
1896. Sidebotham, Dr. E. J., Erlesdene, Bowdon, Cheshire.
1884. Skilton, (Mrs.) Mary, 21, London Road, Brentford, Middlesex.
1886. Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideford, N. Devon.
1886. Smith, Edgar A., F.Z.S., Natural History Museum, S. Kensington, London, S.W.
1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
1894. Smith, Wm. Chas., Vanston House, 7, Vanston Place, Walham Green, Fulham, London, S.W.
1896. Smith, Wm. Rayson, Harleston, Norfolk.
1886. *Z* Somerville, Alexander, B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
1887. Somerville, Rev. James E., M.A., B.D., Castellar, Crieff, N.B.
1886. Sowerby, Geo. Brettingham, F.L.S., 121, Fulham Rd., London, S.W.
1892. Span, Bartlet, Heywood Mount, Tenby, South Wales.
1896. Sparkes, Thomas, 92, Heywood Street, Moss Side, Manchester.
1886. Standen, Robert, 40, Palmerston Street, Moss Side, Manchester.
1888. Stanley, Frederick, Rokeby, Edgar Road, Margate, Kent.
1888. Stirrup, Mark, F.G.S., High Thorn, Bowdon, near Manchester.
1896. Stonestreet, Rev. W. T., 12, Wellington St., Higher Broughton, Manchester.
1888. Storrs, Rev. George Godwyn, B.A., 52, Buxton Road, Stratford, E.
1885. Storey, J. A., B.A., St. Joseph's, High School, Cardiff.
1897. Stracey, Bernard, University Union, Edinburgh.
1890. Stubbs, Arthur Goodwin, 2, Deer Park Villas, Tenby.
1893. Stump, Edward Consterdine, 16, Herbert St., Moss Side, Manchester.
1895. Swanton, E. W., Bratton St. Maur, Wincanton, Somerset.
1895. Sykes, Robert Dardsley, Lostock Hall, near Preston.
1888. Sykes, Ernest Ruthven, B.A., 3, Gray's Inn Place, Gray's Inn, London.

1895. Taylor, Frederick, 38, Landseer Street, Park Road, Oldham.
1897. Taylor, Rev. George W., F.R.S.Canada, F.Z.S., F.E.S., Gabriola Island, Nanaimo, British Columbia.
1886. Taylor, (Miss) Helen L., Woodside, Rowditch, Derby.
O Taylor, John W., F.L.S., Spring Bank, Horsforth, Leeds.
1898. Thomas, G. E., 13, Vicarage Gardens, Kensington, London.
1895. Thompson, Isaac C., F.L.S., 53, Croxteth Road, Liverpool.
1886. Tomlin, J. R. Brockton, B.A., The Green, Llandaff.

1896. Tregelles, George Fox, 5, Clarence Place, Barnstaple.
1897. Tripe, Linnæus, Major-Gen., 3, Osborne Villas, Stoke, Davenport.
1897. Tulk-Hart, Eugene John, M.D.Durh., M.R.C.S., 4, Gloucester Place, Brighton.
1880. Tye, G. Sherriff, 10, Richmond Road, Handsworth, Birmingham.
1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
1891. Walker, Bryant, 18, Moffat Building, Detroit, Michigan, U.S.A.
1896. Wallace, Harry Simpson, Art Gallery, Newcastle-on-Tyne.
1886. Watson, Rev. Robert Boog, LL.D., B.A., F.R.S.E., F.L.S., Free Church Manse, Cardross, Dumbartonshire.
1895. Webb, Wilfred Mark, F.Z.S., Ellerie, Crescent Road, Brentwood, Essex.
1895. Welch, Robert John, 49, Lonsdale Street, Belfast.
1867. West, H. J., 21, Willow Walk, London, S.E.
1886. Whitwell, Wm., F.L.S., 4, Thurleigh Road, Balham, London, S.W.
1895. Wigglesworth, Robert, 13, Arthur Street, Clayton-le-Moors, Lancashire.
1889. Williams, John M., 4, Exchange Alley, Liverpool.
1891. Williamson, Rev. Charles Arthur, M.A., Carnew, co. Wicklow.
1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
1886. *L* Woodward, Bernard B., F.G.S., F.R.M.S., 120, The Grove, Ealing, London, W.
1886. Wotton, F. W., 42, Sotheby Road, Highbury, London, N.
1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

Testacella haliotidea in North Staffordshire.—This mollusc has within the last few weeks been added to the North Staffordshire list, through the energy of Mr. James Kirkby. Some years ago Mr. Kirkby assured me that he had seen *Testacella* in his garden at Trentham, and promised to keep a look out for its again turning up, with the result that on the 5th October last he was able to send me two specimens for identification, which had been found by Mr. Nicklin, of Trentham, in his kitchen garden, on 29th September last, about eighteen inches to two feet below the surface of the soil. Since then three more specimens have been found by Mr. Nicklin, so it is clear that this *Testacella* is well established in the neighbourhood. The question remains—Is it indigenous or introduced? Upon reporting this find of *Testacella* at the last evening meeting of the North Staffordshire Field Club, held on Wednesday, the 17th November last, at Stoke-upon-Trent, a most interesting discussion ensued as to the range of the Testacellidæ in the British Isles, and how far geological formation, especially that of the New Red Sandstone, affects the occurrence of these molluscs. Mr. L. E. Adams, Mr. C. de Rance (of the Geological Survey), and Dr. Hind took part in the discussion. It would seem that sandy or peaty geological formations would not naturally be acceptable environments for *Testacella*, as its food, consisting of earth-worms, is but very scantily found in those formations. I shall be glad to receive information on this subject from any of the members of the Conchological Society who have made the Testacellidæ a study. —JOHN R. B. MASEFIELD, Rosehill, Cheadle, Staffordshire, 22nd Nov., 1897 (*Read before the Society, Dec. 8th*, 1897).

TORSION IN MOLLUSCA.

(The Presidential Address to the Conchological Society, November 13th, 1897).

By Prof. S. J. HICKSON, M.A., D.Sc., F.R.S.

I think we may congratulate ourselves upon the steady progress our society has made during the past year. Our meetings have been well attended, and many of the papers that have been read and printed in the journal have been of greater interest and importance than usual. The valuable papers of Messrs. Melvill and Standen on the shells of Lifu and Uvea form one of the most important contributions to South Pacific conchology of recent years, and the interesting communication made to us by Mr. Moss shows that our members are fully aware of the important bearing of anatomical characters in the arrangement and determination of species.

We must all agree that our informal association with the Manchester Museum has been a great advantage to us. But the advantage is not all on our side. If I were to paraphrase some remarks that fell from the lips of Lord Salisbury when he was President of the British Association, I might say that while as President of the Conchological Society I express our sense of the value of our association with the Museum, as a professor of the Museum I congratulate our staff on the advantages we have gained by association with the Conchological Society.

I trust that in the future, while we strictly maintain our independence and freedom of action, our connection with the Museum may be continued and strengthened.

Before proceeding to the subject of my address, I wish to take this opportunity of calling your attention to an important meeting which has been arranged to be held next year in Cambridge. For the first time in its history, the International Congress of Zoology will meet in England, and it is of great importance for all zoologists to make an effort to render this meeting as successful as those that have already been held. At the last meeting, held in Leyden, some very important papers were read on subjects within the scope of our society's interests, and I have very little doubt that next year several distinguished foreign conchologists will visit England and give us the rare opportunity of making their personal acquaintance. I trust, therefore, that many of our members will join the Congress next autumn, so that our Conchological Society may be well represented in the International Congress of Zoologists.

The subject of Torsion in the mollusca is one which must be of great interest not only to those who are engaged in the study of shells but also to those who have devoted their attention to the anatomical

details of the bodies of these animals. The questions that naturally occur to the conchologist are these—"Why is it that some gastropods such as the limpet have shells which are bluntly conical, while others such as the periwinkle, living under almost precisely similar conditions, have a shell twisted up into a spiral form?"

Anatomical study of the periwinkle shows that it is not only the shell, and the mantle which secretes the shell, that are twisted up into a spiral, but that there is also a distinct twist in certain parts of the nervous system and in other organs of the body.

Let us consider for a moment the structure of the nervous system of one of these twisted gastropods, such as that of *Paludina*. We find that the cerebral ganglia, the buccal ganglia, and the pedal ganglia are perfectly symmetrical, those on the right side being equal to and similar to those on the left. The twist is seen in a nerve loop provided with three ganglionic enlargements, which supplies principally the alimentary tract and some of the other viscera.

Now, if we study the development of these molluscs, we find that the twist is accompanied by, if it is not due to, the imperfect development of some of the most important organs of one side of the body, usually the right side, and that this feature is recognisable at a very early stage in development, *i.e.*, according to the recent researches of Crampton during the segmentation of the egg.[1]

It is perfectly clear, therefore, that the spiral shell of the gastropods is a sign of very far-reaching anatomical peculiarities which, from the early stage at which they appear in the embryo, must have made a very ancient appearance in the evolution of the class.

Now, if we turn our attention to other gastropods, such as *Aplysia*, *Umbrella*, and many of the pteropods, we find that the shell is not spiral in the adult, nor is the visceral loop of the nervous system twisted into the form of the figure 8, as it is in the whelk. On the other hand, we find that some of the organs of the body, such as the kidney, etc., are single, as in the whelks and periwinkles, indicating a suppression of the organs of one side of the body as in those forms.

The difference between these two groups is expressed in Spengel's terms: Streptoneura and Euthyneura, the former including those gastropods with a twisted visceral nerve loop, and the latter those with an untwisted nerve loop. There is no doubt that when malacologists came to realize the importance of Spengel's anatomical discoveries, the opinion was very generally held that the Streptoneura and the Euthyneura represented two branches from a common ancestral stock, which had diverged from one another in the extent to

1. Crampton, Experimental Studies on Gasteropod Development, *Arch. Entwickmech.* vol. 3, p. 1-19, 4 pl., 1896.

which the nervous system had become involved in the twisting of the body. This would be represented by the expression

STREPTONEURA EUTHYNEURA

ANCESTRAL ISOPLEURAN GASTROPOD.

The more recent investigations of some of the Euthyneura have thrown grave doubts upon the correctness of this opinion, and make it almost certain that the Euthyneura must have passed through a primitive streptoneurous condition.

The line of investigation has been somewhat as follows. The order Opisthobranchiata includes those Euthyneura in which the heart usually lies in front of the gill, instead of behind, or at the side of it, as it does in the Streptoneura. Some of these, such as *Actæon*, *Bulla*, *Scaphander*, etc., have a shell that is spirally coiled. Now, if the first theory enunciated above were true, the spiral shell of the Opisthobranchs must have been acquired independently of the spiral shell of the Prosobranchs, and we should expect to find that the genera exhibiting this feature are the most specialized Euthyneura, or in other words, the most divergent from the general structure of the Streptoneura. This is not the case, however. The investigation of the anatomy of *Actæon* by Bouvier, Pelseneer, and others, has shown that this remarkable mollusc has not only a spiral shell, an operculum, a gill in front of the heart, and a general asymmetry of the body, but that it has also a typical Streptoneurous nervous system.

In *Scaphander*, also, a genus with a less tightly twisted shell, although there is no operculum and no actual twist of the visceral nerve loop, the course which the nerves take and the organs they supply, indicate quite clearly that the loop has in this genus been derived from a more primitive twisted condition, the right ganglion of the visceral loop being above the crop and the left below it. Leaving out of consideration several other intermediate forms, and passing on to *Aplysia* and the Nudibranchs, we find that in those Opisthobranchs with an untwisted shell or no shell at all, the visceral nerve loop is perfectly straight and shows practically no sign of its primitive twisted condition.

The evidence derived from a study of the nervous systems of these animals indicates, then, that the euthyneurous condition has been arrived at by an untwisting of a more primitive condition, and this is confirmed and supported by the fact that *Actæon* and *Scaphander*, in which the visceral nerve loop is not completely untwisted, are in other respects more closely related to the Streptoneura than other Euthyneura, and by the fact that many larval Euthyneura have a coiled shell.

I do not propose in this address to discuss any particular theory as to the origin of the twist in the evolution of the Gastropoda. Those of you who are interested in this subject will find an excellent summary of what appears to me to be the most reasonable theory in Lang's Text-book of Comparative Anatomy (English edition, vol. ii., p. 150). The summary that he gives is of importance to us: "The formation of a spire-like shell which has been recognised as the starting-point in the development of the asymmetry of reptant Gastropods, was the only method by which complete protection of the whole body could be attained, and must therefore be considered to have been advantageous under the circumstances."

The loss of the organs of one side of the body and the accompanying twist in the visceral hump and the visceral nerve chord, were due to the gradual evolution of a form of shell which would most efficiently protect the soft molluscan body. The need for protection arose from the danger they were exposed to of falling a prey to carnivorous fish and other marine animals, for we find that all, or nearly all, the Streptoneura protected by a hard shell closed by a strong operculum are edible. They are serviceable as bait for fishes, and in many cases are appetizing to the more critical palate of man himself. The reason for the untwisting is not so easy to understand, but I venture to put before you for consideration a view which appears to me to have some truth in it, and may lead to some further and much-needed investigations on the habits of the Opisthobranchs.

It might be asked in the first place—Why should the Euthyneura have become untwisted and have lost their shell if the streptoneurous condition was such a valuable protection to their bodies from the assaults of their enemies? The answer to this question would be that a heavy spiral shell must be a great encumbrance to the body and impede the locomotion of the animal. It is an encumbrance not only in its weight, but from the fact that to completely protect the whole body the foot must be relatively small. It is, I believe, a well-known fact to conchologists that Streptoneura, like the whelks, winkles, muricidæ, purpuras, and others, that can completely withdraw their bodies into their shell, do not crawl fast nor wander far. They are dependent upon food that is near at hand.

Now, any increase in the size of the foot, bringing with it increased powers of locomotion, would be an advantage to the species in giving it a wider range, but would be a disadvantage to it in leaving the body more exposed. The only other way in which this danger could be met, would be by the adoption of some other method of protection. If, for example, the foot developed glands that secreted a poisonous or disgusting fluid which the enemies of Gastropods

would not touch, the shell protection would be unnecessary, and any increase in the size of the foot would be a positive advantage.

What we do actually find in the group of the Opisthobranchs is this, that in a series shewing a gradual diminution in the twist of the shell, we find a corresponding increase in the size of the foot, both as regards its mass and the surface it exposes to the ground. The increased activity in locomotion is exhibited in the remarkable migrations which are so characteristic of the Opisthobranchs. Their distastefulness is shown in the fact that none of them are used as human food, and I have heard of none that are used for bait. Prof. Herdman and Mr. Cole have made a series of investigations which prove that many of the Nudibranchs are really distasteful to fish.

But the untwisting of these animals was not only due to the need of increasing the foot area for purposes of locomotion, but partly also to facilitate the return to a condition of bilateral symmetry. All animals that move rapidly are bilaterally symmetrical. It stands to reason that the form of body that is best suited to rapid movement is one in which the right and left sides are evenly balanced. Fish, cuttlefish, lobsters, segmented worms, and flat worms, not to mention steam-engines and steam-ships, are all bilaterally symmetrical.

There is another method by which the Gastropods may have been able to dispense with the protection afforded by a capacious shell, and that would be by adopting a habit of making short jumps or flights through the water, after the manner of Pecten. Although such habits would not protect them from fish and other free-swimming enemies, it would afford them a means of escape from many of the crustacea, from predaceous Gastropods, and from other creeping and crawling enemies. One of the first steps in this direction would be a diminution in the weight of the shell and a lightening of the soft tissues of the body by the absorption into them of a relatively large quantity of sea-water.

We see in *Aplysia*, one of the Tectibranchs which still crawls, an example of a body that has become in this manner lighter, softer, and more gelatinous in consistency. This lightening of the tissues by the absorption of water is usually accompanied by an increase in their transparency, and we find examples of this not only in the mollusca, but in the jelly-fish whose bodies are composed of no less than 95 per cent. of water, in the free-swimming Tunicates, in the pelagic worms, and in other groups of animals. If such a transparency of the body were acquired, it would serve not only the purpose of reducing the weight of the body, thus rendering possible longer and more sustained flights through the water; but it would also be a protection to the animals in rendering them less conspicuous to their free-swimming

enemies. But a return to a condition of bilateral symmetry would be as important for these swimming Gastropods as it is for the crawling Opisthobranchs, and we do actually find in the anatomy of the different genera of the Pteropods a series of stages in the gradual unwinding of the body which this theory assumes.

The story of the relations of the Pteropods as related by Boas and Pelseneer is one that has found a place in every recent edition of our hand-books of mollusca, so that it is not necessary for me to rehearse it now. I would simply point out to you that it is one which, though differing in some important particulars, runs remarkably parallel with the story of the untwisting of the Opisthobranch body.

The last group of the Euthyneura which calls for comment is that of the Pulmonata. There is very good reason for believing that these animals have been derived independently of the other Euthyneura from a Streptoneurous ancestry.

An operculum is retained in *Amphibola* through life, and is found in the larval stages of *Auricula* and other genera. In *Auricula*, too, we find a long visceral commissure, very unlike the very short commissure we find in *Helix* and *Limnæa*. Moreover, in *Auricula* and in *Chilina* we find a distinct asymmetry in this commissure similar to that already referred to in *Scaphander*, which points most certainly to a streptoneurous ancestry. It is probable that in taking to a terrestrial habit, feeding on decaying vegetable matter in the marine swamps, *Auricula* has escaped from many enemies that preyed upon its ancestors, and for this reason has been able to dispense with the protection afforded by an operculum.

But the work required to drag the body and shell of an animal through the air must be much greater than that required in sea-water, and would in most cases need a greater exposure of foot and body during locomotion. I do not know that any researches that have been made comparing the amount of the exposure of the body of Pulmonates during locomotion with that of the marine Streptoneura, but I think it would probably be found if the matter were inquired into that the former do expose their bodies more than the latter. If this be actually the case, or even if it were true only of the ancestral Pulmonates, it would be quite sufficient to account for the return of these animals to a euthyneurous condition. It would mean, of course, the rearrangement of the primitively asymmetrical organs into a secondary symmetrical system, and this would be accompanied, as in the Opisthobranchs and Pteropods, by an untwisting of the visceral nerve loop.

If it be not true, *i.e.*, if the Pulmonata as a group do not expose their bodies more than the others, then it must be confessed it is difficult to account for their euthyneury.

In these few words I have endeavoured to express to you the lines of work and thought which appear to me to have been most prolific in clearing away the difficulties which stand in the way of our founding a natural classification of the Gastropoda. You will notice that a great deal depends upon a correct interpretation of the anatomy of certain genera, namely, *Actæon*, *Scaphander*, *Auricula*, *Chilina*, and their allies; and I would point out to you that a still more profound investigation of the anatomy, habits, variations, and distribution of these genera might lead to important results in favour of or against the views I have enunciated. We often fall into error in struggling towards the truth, and it may be that these views are quite erroneous; but the knowledge we have at present seems to support them, and they must stand provisionally until some stronger evidence is brought forward to disprove them.

Note on some French Shell Names.—Every one knows the eminence of continental conchologists and how wide and minute are their studies. But woe and wailing is caused to their English brethren by the habit of giving specific names to ordinary variations of common shells. In the course of exchange I have several times been much disappointed in this way, though, of course, the shells are sent in good faith. To-day I received *H. sebkarum*, *H. pilula*, *H. halophila*, *H. erythræa*, *H. intersecta*, and *H. da sylvæ* all of which (with possibly one exception) are variations of *H. virgata*; *H. galena* and *H. eugastera* are also sent, which are only two of the dozens names given to variations of a common Algerian shell. I have it already under the names of *H. bleicheri*, *H. colonnesiana*, *H. zaffarina*, etc. *H. cuttati*, also sent, is only an insignificant variety of *H. pisana*. It would be a philanthrophic act if some good conchologist would give English collectors a list of the names which are given abroad to *H. vermiculata*, *H. lactea*, *H. virgata* (or *variabilis*), and *H. pisana*. It might take up two or three pages of the Journal, but it would save much vexation of spirit. From another French conchologist I received once *H. ververi*, *H. lauta*, *H. tussiana*, *H. avenionensis*, *H. kalona*, *H. alluvionum*, *H. chiodicoposis*, *H. cyzicensis*, *H. arenosa*, *H. arigoi*, *H. luci*, and *H. fera*—every one of which was *H. virgata*, varying chiefly in size.—J. W. HORSLEY (*Read before the Society*, October 13th, 1897).

Paludestrina [Hydrobia] jenkinsi Smith, **in Ireland.**—While at Ballycastle last May (1897), Mr. R. Welch, of Belfast, showed me some shells of the above species which he had taken in 1893, and also with Capt. Farrer in 1896, from my old hunting ground at the mouth of the Bann. Mr. Welch has ascertained for me that three firms import Baltic timber at Coleraine and that a considerable amount was used for the Bann Mouth Extension Works. In 1883–1884 I did a good deal of collecting in this locality and I fancy I should have remarked the shell if I had come across it, as it was then an unknown form.—LIONEL E. ADAMS, Stafford (*Read before the Society*, December 8th, 1897).

OBITUARY NOTICE OF THE LATE REV. WILLIAM TURNER.

(Read before the Society, November 13th, 1897).

THE Rev. William Turner, whose death on 21st September we regret to have to record, was born in 1826 at Preston, Berwickshire, but his boyhood was spent in the sea-coast town of Dunbar, where may have been laid in the active observant mind of the boy the foundation of that interest in conchology which was awakened and developed in later years. After a distinguished career at the University of Edinburgh, especially in philosophy, Mr. Turner chose the clerical profession, and settled in a country charge in Aberdeenshire, where he devoted himself with rare zeal and intensity to the duties of his office, and to all scholarly study pertaining to his profession; and bye and bye was recognized in the north-east of Scotland as one of the foremost preachers and ripest scholars in the church; and but for his retiring disposition and excessive modesty, would doubtless have been much more widely known.

Mr. Turner was a man of the widest intellectual activity. His life as a country clergyman, with extended holiday rambles, gave him the opportunity of studying botany and kindred subjects, and it was not in his nature to miss the opportunity; at first he was especially devoted to botanical science, and his stores of varied and accurate knowledge were the constant astonishment of his friends.

Comparatively late in life he was attracted by conchology, and pursued it with the keenest interest, leaving behind him a valuable museum of shells, especially rich in species from Borneo and South Africa.

It is, however, right to note that these studies were but his recreation. Removed from his country charge to Edinburgh some twenty-five years ago, he retained all his devotion to the work of his profession, till failing health compelled him two or three years ago to resign his office. Though strength had been declining for some years, his final illness lasted only a few days.

British Snails as Human Food.

During a recent visit to Teignmouth, South Devon, I was surprised while walking along the sea shore one morning to meet a man occupied in picking up shells, not with a view to collecting, but merely for edible purposes. He stated that he often made his breakfast of snails gathered in his morning walk, and suggested that the excellence of the mollusk had only to become more widely known for it to be better appreciated and valued as human food.—PETER LAWSON (*Read before the Society*, December 8th, 1897).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

264th Meeting, October 13th, 1897.

Mr. J. Cosmo Melvill, Vice-President, in the chair.

Donations to the Library announced and thanks voted:

Armature of Helicoid Land-Shells, by G. K. Gude; La Feuille des Jeunes Naturalistes, nos. 322–324; The Naturalist, nos. 265–267; The Irish Naturalist, vol. 6, nos. 8–10; Journal de Conchyliologie, vol. 45, no. 1; Journal of Malacology, vol. 6, no. 2; Science Gossip, vol. 4, nos. 36–39; Transactions of the Academy of Science of St. Louis, vol. 4, nos. 4–16; On the Genus *Remondia* Gabb, by T. W. Stanton; Report of the Manchester Museum, 1896-97; Notes from Manchester Museum, nos. 1–4; Proceedings of the U.S. National Museum, 1110, 1111, 1120; Bullettino della società malacologica Italiana, vol. 20; Smithsonian Report, U.S. National Museum, 1893 and 1894; Journal and Proceedings of the Hamilton Association, no. 13, 1896-97; Records of the Australian Museum, vol. 3, no. 2; Geological Survey of Canada, Annual Report, 1895, vol. 8; Emleklapok, no. 29, Vandorgyülese Alkalmabol, by A. Pechany; Journal and Proceedings of the Royal Society of New South Wales, vol. 30, 1896; Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 41, part 4; Transactions and Proceedings of the Perthshire Society of Natural Science, vol. 2, part 5, 1896-97; *Paludestrina jenkinsi* Smith, by L. E. Adams; Australian Museum Report, 1896; Catalogue of the Tertiary Mollusca (Brit. Mus.), part 1, Australasia, by G. F. Harris; Catalogue of the Fossil *Cephalopoda* (Brit. Mus.), part 3, by A. H. Foord and G. C. Crick.

Donations to Cabinet announced and thanks voted,

By Mr. A. G. Stubbs: A further instalment of choice specimens of land and freshwater shells from Tenby.

New Members Elected:

Mrs. Agnes Fleming Kenyon, F.R.S. Tasmania, Ass. Mem. Linn. Soc. N.S.W., 291, Highett Street, Richmond, Melbourne, Victoria.

Miss Mary Lodder, Lonah, Ulverstone, Tasmania.

Mr. Henry Clifden Burnup, Pietermaritzburg, Natal.

Mr. D. D. Baldwin, M.A., Haiku, Maui, Hawaiian Islands.

Rev. Amos Kendig, D.D., 86, Vernon St., Brookline, Mass., U.S.A.

Candidates Proposed for Membership.

Messrs. Owen G. Evan-Thomas; Herbert Bolton, F.R.S.E.; John Farquhar; Eugene John Tulk-Hart; Wm. Lewis May; Philippe Dautzenberg; Chas. Edw. Beddome: Rev. Geo. W. Taylor; Dr. C. C. Claremont.

Member Deceased.

Rev. W. Turner.

Papers Read.

"The Marine Mollusca of Madras and the immediate Neighbourhood," by J. Cosmo Melvill and R. Standen.

"Note on some French Shell-Names," by Rev. J. W. Horsley.

Exhibits.

By Mr. A. G. Stubbs: Series of land shells from the Tenby district, including *Helix pisana* (type and five semi-scalariform specimens); *H. virgata* (eight monstrosities); *H. itala* and vars. *lentiginosa*, *minor*, *alba*, and *leucozona*; and a beautiful series of *C. elegans* var. *fasciata* and *ochroleuca* from underneath privet bushes in the Jubilee Gardens, Tenby.

By Rev. J. W. Horsley: A remarkable series of *Helix aspersa* from a hedge near Dover, showing, apparently, interbreeding between var. *grisea* and var. *zonata*.

By Mr. Thomas Edwards: *Mytilus edulis* var. *incurva*, and some curiously deformed examples from Birchington, Kent; *Venus gallina*, *Tapes pullastra*, *Tellina crassa*, *Saxicava rugosa*, *Nassa reticulata*, and *Crepidula fornicata* (probably introduced with American oysters), all from Grimsby; *Buccinum undatum* monst. *acuminatum* from the Kentish coast, also var. *zetlandica* dredged off Shetland; and *H. nemoralis* var. *rubella* oooo with a broad white peripheral band, taken within the borough of Leicester.

By Mr. J. C. Melvill: *Hemipecten forbesianus*, dredged by Captain Tyndall, in 40 fathoms, off the Laccadive Islands.

By Mr. F. Taylor: *Helix nemoralis*, *H. pygmæa*, *H. aculeata*, *H. hispida* var. *hispidosa*, *Succinea elegans*, *Hyalinia pura* var. *nitidosa*, and *Hy. radiatula*, from Riversvale; *Hyalinia nitidula* and *Clausilia rolphi* from Bostal Wood.

By the Manchester Museum: The new species and general collection of Madras Mollusca dealt with in Messrs. Melvill and Standen's paper.

265th (Annual) Meeting, Saturday, November 13th, 1897.

Prof. S. J. Hickson, F.R.S. (President), in the chair.

Appointment of Scrutineers.

Messrs. E. Collier and L. St. George Byne were appointed scrutineers.

Annual Reports and Balance Sheet.

The Annual Report of the Council (see p. 20), the Report of the London Branch (see p. 23), and the Treasurer's Statement (see p. 22) were presented and adopted.

Election of Office Bearers.

The Scrutineers reported that the Officers and Council nominated by the Council had been elected with scarcely a dissentient vote.

For PRESIDENT:
Mr. JOHN R. B. MASEFIELD, M.A.

For VICE-PRESIDENTS:
Mr. R. D. DARBISHIRE.
Mr. J. COSMO MELVILL, M.A., F.L.S.;
Prof. SYDNEY J. HICKSON, D.Sc., M.A., F.R.S.;
Mr. EDGAR A. SMITH, F.Z.S.

For HON. TREASURER:
Mr. LIONEL E. ADAMS, B.A.

For HON. SECRETARY and LIBRARIAN:
Mr. W. E. HOYLE, M.A., F.R.S.E.

For HON. CURATOR:
Mr. ROBERT STANDEN.

For HON. RECORDER:
Mr. THOMAS ROGERS.

For the COUNCIL:
Mr. EDWARD COLLIER;
Mr. J. T. MARSHALL;
Mr. P. B. MASON, J.P., M.R.C.S., F.L.S.;
Mr. WILLIAM MOSS, F.C.A.;
Mr. R. F. SCHARFF, Ph.D.;
Mr. E. C. STUMP.

New Members Elected.

Mr. Owen G. Evan Thomas, Gnoll, Neath, Glamorganshire.

Mr. Herbert Bolton, F.R.S.E., 94, Dickenson Road, Rusholme, Manchester.

Dr. C. C. Claremont, Millbrook House, Hampstead Road, London.

Mr. John Farquhar, 3, Rose Terr., African Str., Grahamstown, Cape Colony.

Mr. Eugene John Tulk Hart, M.D., Durh., M.R.C.S., 4, Gloucester Place, Brighton.

Mr. William Lewis May, F.R.S. Tasmania, Forest Hill, Sandford, Tasmania.

M. Philippe Dautzenberg, 213, Rue de l' Université, Paris.

Mr. C. E. Beddome, Hillgrove, near Hobart, Tasmania.

Rev. G. W. Taylor, F.R.S. Canada, F.Z.S., F.E.S., Gabriola Island, Nanaimo, British Columbia.

Candidates Proposed for Membership.

Miss Maria Glover, Dr. John Bingham Fitzsimons.

Resignation of Members.

Mrs. B. J. Falloon, Mr. P. J. Rufford.

Place of Meeting.

On the invitation of the newly-elected President, Mr. J. R. B. Masefield, it was resolved that the next Annual Meeting be held at Stafford in the month of October.

The Presidential Address

was then delivered by the retiring President, Prof. S. J. Hickson, who took for his subject "Torsion in the Mollusca" (see p. 9).

A vote of thanks to the President for his services during the year and for his address was proposed by Mr. Masefield, seconded by Mr. J. Cosmo Melvill, and carried unanimously.

The meeting then adjourned to view the exhibits which had been displayed in another room.

Exhibits.

By Mr. R. D. Darbishire: Two series of shells illustrating sinistration, namely: A fine suite of the formerly normal *Fusus contrarius* from the Coralline Crag at Orford and the Red Crag at Woodbridge, and of the now so-called reversed monstrosity of *Fusus antiquus* from the mouth of the Thames; also some of Mr. McAndrews' original specimens of *F. contrarius* Linn. (also Weinkauff) from Vigo Bay. In Pulmonifera: a good series of *Helix pomatia*, showing both the helical and sinistral varieties, and similar series of *H. nemoralis* and *H. pisana*. Two large specimens of *Pholas costata* received by Mr. Sowerby from the S. W. Coast of Florida.

By Dr. G. W. Chaster: Certain of the rarer and more interesting minutiora from British and other seas, including recent additions to the British fauna, *Neolepton obliquatum* Mtros., *Adeorbis unisulcatus* Ch., newly-described Pyramidellidæ from the Azores; and rare Mediterranean Pyramidellidæ, Cæcidæ, etc.

By Dr. R. F. Scharff: *Helix nemoralis* (form major), Aran Islands, co. Galway; *H. nemoralis* (form minor), Derrynane, co. Kerry; *H. fusca*, Devil's Glen, co. Wicklow; *H. hortensis* (form minor), Ems, Germany; *H. arbustorum* var. *alpicola*, Mürren, Switzerland; *Succinea virescens* Mor., Castletown-Berehaven, co. Cork; *Balea perversa* var. *lucifuga*, Castletown-Berehaven, co. Cork; *Planorbis corneus*, Monastereven, co. Meath; *Neritina fluviatilis*, Lough Derryvaragh, co. Westmeath.

By Mr. J. Cosmo Melvill: A new species of *Mülleria*, described Nov. 12th, 1897, by Mr. E. A. Smith, collected by Mr. Daly in fresh water ghauts, Mysore, India (the only other species, *M. lobata*, is South American); also 36 species of

marine shells from the Indian Ocean, dredged by Mr. Townsend, Captain Shopland, and Mr. G. H. Booley—all new and shortly to be described.

By Mr. R. Standen: Ten specimens of *Buccinum undatum* monst. *sinistrorsum*, dredged off Isle of Thanet, Kent, in 20—50 fathoms (ex coll. T. Edwards); also *Aporrhais pes-pelecani*, varieties and locality series from Isle of Man, Teignmouth, Brora, Loch Fyne, Rothesay, Larne, etc.; *A. mac-andreæ* from Shetland; *A. senegalensis*; and *A. occidentalis* from Labrador.

By Mr. Thos. Rogers: A series of *Helix virgata* and its varieties, collected in Britain, contrasted with a similar set of forms collected in France, to which specific names have been assigned by French conchologists.

By Mr. Edward Collier: A collection of *Cochlostyla*, 140 species, including *C. connectens*, *C. dactylus*, *C. evanescens*, *C. fuliginata*, and *C. versicolor*, received by him from Dr. von Möllendorf.

By Mr. J. Ray Hardy: A drawer of the British *Teredines* and *Xylophagæ*, with examples of their borings in oak, spruce, mahogany and other timber.

By Mr. T. Bird Hall: Remarkably fine *Cypræa scotti*, *C. decipiens*, and *Harpa conoidalis*.

By Mr. Fred. Taylor: A fine series of land and freshwater mollusca from the Ashton-under-Lyne district.

By Mr. C. E. Wright: A beautiful and extensive series of *Helix nemoralis* and *H. hortensis*, including a sinistral example of the latter, and choice varieties of both species, all from the neighbourhood of Kettering.

By Mr. R. Cairns: Many choice varieties of the genus *Cypræa*.

By Mr. Wm. Blake: *Patella vulgata* covered with a remarkable parasitic growth of the young "cups" of a large alga, *Himanthalia lorea*.

From the Society's Cabinet: A number of drawers of land and freshwater shells, and the fine series of Tenby land shells presented by Mr. A. G. Stubbs.

By the Manchester Museum: Eight drawers of recent additions to the Museum collections, namely, very full and illustrative sets of *Glandina*, *Streptostyla*, *Streptaxis*, *Ennea*, *Sagda*, *Cochlostyla*, several sections of *Helix*, *Terebra*, rare Pelecypoda from China and Japan, a choice set of exotic Brachiopoda, a collection of marine shells from Lively Island, Falklands, a series of the section *Cylinder* of *Conus*, and the seven new species described in Messrs. Melvill and Standen's paper on "Madras Mollusca" (see p. 30).

ANNUAL REPORT, 1896—97.

In handing in the second Annual Report since the removal of the Society's headquarters to Manchester, it is pleasant to be able to record a year of sustained activity in all departments of the Society's work.

The Annual Meeting has been unavoidably postponed to a later date than last year and the report therefore extends over a period of 14 months and covers 11 monthly meetings.

In April last a letter was drawn up by the President and Secretary and circulated among suitable persons inviting them to join the Conchological Society; partly, at all events, as a result of this letter, thirty-one new members have been elected since the last annual meeting. Against this increase must be set the loss of five members by death and eight by resignation, while no less than seven have been struck off the list for non-payment of their subscriptions, showing a net gain of eleven. There are now on the list 10 honorary members and 233 ordinary members, of whom 92 are resident abroad, making a total of 243.

The five members of the Society whose decease we announce with great regret are David Robertson, LL.D., the veteran naturalist of Cumbræ, of whom a brief memoir has already appeared in the Journal, the gifted Lancashire authoress, Mrs. G. Linnæus Banks, the Rev. C. Crawshaw, Mr. F. Hepburn, and the Rev. William Turner, of whose career a brief account will be found elsewhere (see p. 16).

The average attendance at the meetings has been quite equal to the usual standard and the exhibits provided by members have by no means decreased in number or fallen off in interest and variety.

At the meeting of the Society on March 10th, 1897, the Council resolved that during the vacation meetings be omitted. On the 14th April it was further resolved that the hour of 6-30 having proved inconvenient for members' attendance, the meetings should henceforth open at 7 o'clock.

A large number of papers have been read in the course of the year, most of which have already been published in the Journal. The following is a list of these communications:—

Rev. J. W. Horsley: "The Mollusca of Plumstead Marshes."

R. Standen and J. R. Hardy: "Notes on the land shells of Ballycastle district, co. Antrim, Ireland.

G. W. Chaster: "Notes on some shells dredged off Rathlin Island and Ballycastle, co. Antrim, Ireland."

W. E. Hoyle: "Obituary notice of the late David Robertson, LL.D."

J. T. Marshall: "The Marine shells of Scilly."

E. Collier: "Shells collected at Corbeyrier, S. Aigle, Rhone Valley, Switzerland, in September, 1896."

G. W. Chaster: "Note on *Scintilla eddystonia* Marshall."

C. E. Wright: "Note on a colony of *Cæcilioides acicula* Müll. in Northamptonshire."

W. Moss: "Preliminary note on the genitalia of *Hyalinia* (*Zonitoides*), *nitida* Müll. and *Hyalinia excavata* Bean.

J. C. Melvill and R. Standen: "Notes on a collection of shells from Lifu and Uvea, Loyalty Islands, formed by the Rev. James and Mrs. Hadfield, with list of Species" (parts ii. and iii.).

J. Yate Johnson: "Description of *Helix watsoni*, a new species of land shell discovered at Madeira, by Senhor J. M. Moniz."

C. H. Morris: "*Helix aspersa* m. *sinistrorum* at Lewes."

E. A. Smith: "A List of the Land and Freshwater Mollusca of Trinidad."

J. T. Marshall: "Additions to British Conchology (Part ii.)."

C. E. Wright: "New form of *Helix terrestris* Penn."

J. C. Melvill and R. Standen: "The Marine Mollusca of Madras and the immediate Neighbourhood."

Rev. J. W. Horsley: "Note on some French shell names."

Five numbers of the Journal have been published since the last meeting, containing 218 pages, illustrated by three plates and numerous woodcuts. The current number of the Journal concludes the eighth volume, the first issued under the management of the Society, which is now complete excepting the title page and index now in the press. It contains 480 pages, 9 plates, and 9 illustrations in the text, a somewhat larger amount of letterpress and a much larger number of figures than any previous volume. It is satisfactory to report that the Editor has always had in hand a supply of interesting material awaiting publication; indeed the pressure has been so great that the Council has resolved upon a slight increase in the size of the printed page, in order to afford more space for the communications of the members.

Anonymous donations amounting to £17 6s. 6d. have been received by the Editor towards the expenses of publication of the Journal.

In addition to taking charge of the Society's collection and incorporating the accessions therein, the Curator constantly receives consignments of shells which he is requested to identify for members. He has done a great deal of such work during the past year, and is always most willing to help his fellow workers so far as his time permits, but the Council wish it to be distinctly uuderstood that such work is no part of his duties as an officer of the Society, and that those members who avail themselves of his services in this direction place themselves under a direct personal obligation to him.

A donation of 5/- has been received towards the Cabinet Fund, but as there is no need for further extension in this direction the Council has resolved that this sum and a few other recent gifts should, subject to the approval of the donors, be devoted to binding the books in the library, and it is hoped that this may be shortly carried out.

Hon. Treasurer's Report.

The year 1896 may be regarded as satisfactory, the amount of members' subscriptions showing an increase of £6 7s. 6d. on that of the last year. The expenses, however, have been heavier than usual, owing to the issue of an extra number of the Journal and the lithographing of several plates, though the latter expense has been partly defrayed by generous donations.

BALANCE SHEET.

GENERAL FUND.

Receipts.	£	s.	d.	Payments.	£	s.	d.
Balance from 1895	13	16	7	Cost of Journals (Nos. 2, 4, 5, 6, 7, vol. viii.)	52	15	10
Subscriptions received in 1896	49	5	0	Expenses of Editor and Secretary	10	19	3
One Composition Fee... ...	3	3	0	Expenses of Treasurer ...	2	11	6
Sale of Journals, reprints, etc.	8	3	7	Photos, Plates, etc.	8	19	0
Donations	8	17	6	Reprints	3	13	10
By Advertisements	2	0	0	Stationery	1	0	0
				Subscription to Y.N.U. ...	0	2	6
				Museum Expenses	0	2	6
				In hand	5	1	3
	£85	5	8		£85	5	8

CABINET FUND.

Receipts.	£	s.	d.	Payments.	£	s.	d.
Balance from 1895	0	18	3½	Expenditure nil	0	0	0
Donations in 1896	0	10	0	In hand	1	8	3½
	£1	8	3½		£1	8	3½

LIONEL E. ADAMS, *Hon. Treasurer.*

Audited and found correct, *March 25th, 1897*,
E. C. STUMP,
J. H. KILLINGBECK.

LONDON BRANCH.—Annual Report.

Since the last report 13 meetings of this branch have been held. There were eight field meetings, viz., at Barnes, Shoreham (Kent), Swanley, Box Hill, West Drayton, Finchley, and Caterham. At Shoreham, on September 26th, 1896, the members present enjoyed a ramble over the chalk downs and were afterwards most hospitably entertained by the Rev. R. Ashington Bullen, who showed them his collection of shells, which includes a fine British specimen of *Helix pomatia* m. *sinistrorsum*. The Swanley meeting, May 1st, 1897, was fairly well attended and some rare varieties of *Helix hortensis* were collected. On Nov. 6th, 1896, Mr. William C. Smith invited the Branch to inspect his collection and a pleasant evening was spent by those present. On December 10th, 1896, Mr. S. J. DaCosta most kindly exhibited part of his very fine collection, which contains several types and numerous rare species. The series of *Bulimus* and its allies were exceedingly good, and so were the West Indian *Helices*. A beautiful set of *Cochlostyla* and some brilliant *Amphidromus* were much admired. A fine set of *Opisthostoma* was specially noticeable, some pretty Pteropoda, a number of gorgeous Pectens and some curious mollusca from Lake Tanganyika. But the time was quite insufficient for the examination of all Mr. DaCosta's rarities. At the meeting in April, 1897, the Rev. J. W. Horsley contributed a paper on "*Helix hortensis* and *Helix nemoralis*, their varieties and nomenclature," this has since been published in the "Journal of Malacology." The members of the London Branch desire to cordially thank those gentlemen who have kindly allowed them to see their collections, and hope other members will extend the same privilege to them during the winter months.

9th Nov., 1897. J. E. COOPER, *Hon. Sec.*

266th Meeting, December 8th, 1897.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted:

The Scottish Naturalist, no. 24; The Nautilus, vol. 11, nos. 1-7; La Feuille des Jeunes Naturalistes, nos. 325, 326; The Naturalist, nos. 268, 269; The Irish Naturalist, vol. 6, nos. 11, 12; Journal de Conchyliologie, vol. 45, no. 2; Variation in colouration and zonulation in *Tachea* L., by A. E. Boycott (*from the author*); Note on some new or interesting species of shells from British Columbia and the adjacent region, by W. H. Dall (*from the author*); Science Gossip, vol. 4, nos. 40-43; Armature of helicoid land-shells, by G. K. Gude (*from the author*); Abstract of the Proceedings of the Royal Society of New South Wales, May-Oct., 1897; Natural history of economic mollusks of the United States, by E. Ingersoll and J. A. Ryder; Report on the European methods of oyster culture, by Bashford Dean; Report on the present methods of oyster culture in France, by Bashford Dean; The physical and biological characteristics of the natural oyster grounds of South Carolina, by Bashford Dean (*from W. E. Hoyle*).

New Members Elected:

Miss Maria Glover, 124, Manchester Road, Southport.

Mr. John Bingham Fitzsimons, M.D., 14, St. Owen Street, Hereford.

Candidates Proposed for Membership:

Mr. John Davy Dean, Mr. Frederick James Partridge, Mr. Arthur S. Poore.

Resignation;

Mr. Graham Renshaw.

Papers Read:

"Observations on the pairing of *Limax maximus* L.," by L. E. Adams.

"The land and freshwater mollusca of the district between Ashton-under-Lyne and Oldham," by F. Taylor.

"*Testacella haliotidea* in North Staffordshire," by J. R. B. Masefield.

"*Paludestrina* (*Hydrobia*) *jenkinsi* Smith," in Ireland," by L. E. Adams.

"Sense of smell in *Limax maximus* L.," by L. E. Adams.

"Brltish snails as human food," by Peter Lawson.

Exhibits:

By Mr. F. Taylor: Land and freshwater shells of the Ashton-under-Lyne district, to illustrate his paper.

By Miss Helen Taylor: A set of marine shells from Vancouver, British Columbia.

By Mr. Lionel E. Adams: Drawings to illustrate his paper on the pairing of *Limax maximus*.

By the Manchester Museum: A collection of 150 species of marine mollusca and Brachiopoda, from Nanaimo, Vancouver Island, B.C. This collection, which has recently been presented to the Museum, was made by Mr. Walter Harvey, and contains fine specimens, all dredged, and in excellent condition, of *Panopæa generosa*, *Tresus nuttalli*, *Spisula falcata*, *Cerostoma foliata*, *Chrysodomus tabulatus*, *Purpura crispata*, *Volutharpa ampullacea*, *Tritonium oregonense*, &c.

Sense of Smell in Limax maximus.—At Clifton, Derby, Aug. 22nd, 1897, at 10 p.m., on a dark, rainy and windy night, while out in the garden with a lantern, I observed a full-grown *Limax maximus* making a "bee-line" across the lawn towards a plate about six feet distant, which contained bones and beans—the remains of the dog's dinner. Remembering Mr. J. W. Taylor's mention of Moquin-Tandon's experience ("Monograph," p. 299), I watched to see if the slug was actually making its way purposely towards the plate, and I found this to be the case. When the animal had reached the plate, I removed the plate another six feet away, and immediately the slug directed its course straight towards it. When about four feet had been traversed, I again moved the plate in another direction (making the distance from slug to plate eight feet), and again the animal changed its course and started direct for the plate. A third time I moved the plate in another direction to a distance of eight feet, and again the animal changed its course, with no apparent hesitation, and glided straight towards the plate. The point to notice is that while Moquin-Tandon's experience was in the day-time, mine was in the dark, showing that the perception of direction was not due to the sense of sight, and even if it were possible for these creatures to see in the dark, the grass standing up higher than the animal for a distance of many feet would preclude this possibility.—LIONEL E. ADAMS, Stafford. (*Read before the Society*, Dec. 8th, 1897).

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[Space forbids our indicating more than the contents of the last three numbers, which are:] SEPTEMBER—"Bolinas, California: the conchologist's paradise," by W. M. WOOD [with list of species]. "Note on a Californian *Helix*" [*Epiphragmophora californiensis* var. *contracostæ*], by H. A. PILSBRY. "New Unios" [*U. buxtoni*, *U. suttoni*], by B. H. WRIGHT. "*Purpura lapillus*," by Mrs. J. D. WENTWORTH. OCTOBER—"New land-shells from Mexico and New Mexico," by W. H. DALL. "On two new species of *Amphidromus*," by C. F. ANCEY. "New speciesof tertiary mollusca from Vancouver Is.," by J. C. MERRIAN. NOVEMBER—"New species of Mexican land-shells," by W. H. DALL. "Description of a new variety of land-shell from Idaho," by H. HEMPHILL. "Notes on slugs," by T. D. A. COCKERELL. "A classified catalogue of American land-shells, with localities" (cont.), by H. A. PILSBRY.

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"Notes on some recent additions to Ontario palæontology," by C. C. GRANT,

ON SOME LAND SHELLS FROM TRINIDAD.

By EDGAR A. SMITH.

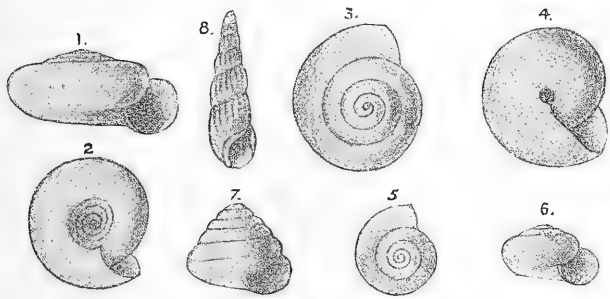
(Read before the Society, July 14th, 1897.)

Since the publication in this Journal[1] of "A List of the Land and Freshwater Mollusca of Trinidad," a few additional species have kindly been brought to my notice by Mr. J. H. Ponsonby, who obtained them during a recent visit to the island, in conjunction with Mr. Lunt, of the Botanical Gardens at Port of Spain. They are as follows :—

1. Vitrea lunti, n. sp. (figs. 1, 2).

Testa minuta, discoidea, aperte umbilicata, tenuis, pellucida; spira paulo elata, ad apicem obtusa; anfractus 4½ convexi, sutura profunda sejuncti, striis spiralibus aliisque transversis microscopicè cancellati; apertura obliqua, lunata; peristoma tenue, margine columellari haud reflexo. Diam. maj. 1½ mm., alt. ¾.

Chiefly characterized by the convex whorls, deep suture, open umbilicus and microscopic cancellation of the surface.



2. Sophina trinitaria, n. sp. (figs. 3, 4).

Testa minuta, anguste perforata, orbicularis, supra obtuse conoidea, vitrea, tenuis, pellucida, polita; anfractus 4½ convexiusculi, lente accrescentes, infra suturam zona hyalina leviter concava marginati, lineis incrementi tenuissimis sculpti; ultimus infra in medio impressus, in umbilico angustissimo carina acuta, intrante usque ad columellam continua, instructus; apertura oblique lunata; peristoma tenue, margine columellari anguste reflexo. Diam. maj. 2½ mm., alt. 1½.

At once distinguished from all the other similar species from Trinidad by the keel within the umbilical perforation. This is a third instance of the occurrence of Indian forms in Trinidad, the others being *Ennea bicolor* and *Diplommatina occidentalis*. The question arises—Are all three importations?

(1) Vol. 8, pp. 231—251.

3. Guppya hallucinata, n. sp. (fig. 7).

Testa angustissime perforata, conoidea, ad apicem obtusa, corneo-fuscescens, nitida; anfractus 5 convexi, sutura profunda sejuncti, lineis incrementi confertis microscopicis striati, lente accrescentes; ultimus postice ad peripheriam leviter angulatus, subtus concentrice tenuiter striatus; apertura oblique lunata; peristoma tenue, margine columellari superne leviter reflexo. Diam. maj. 3 mm., alt. 3.

Very like *G. semen-lini*, but rather more elevated in the spire and with the upper surface of the whorls merely microscopically striated with lines of growth and not cancellated. The body-whorl also is less sharply keeled.

Luntia, n. g.

Testa elongata, gracilis, imperforata, columella tortuosa, antice oblique truncata, callo reflexo induta, labro superne prope suturam conspicue sinuato, infra sinum leviter incrassato.

This genus of Stenogyridæ is allied to *Subulina*, but is distinguished by the sinus at the upper part of the labrum. The following is the only species at present known.

4. Luntia insignis, n. sp. (fig. 8).

Testa parva, elongata, gracilis, imperforata, alba, ad apicem mammillata; anfractus 7, supremi duo magni, læves, cæteri convexi, costellis tenuibus arcuatis inferne plus minus desinentibus, supra, ad suturam productis, instructi; apertura parva, inverse auriformis; columella arcuata, inferne torta, oblique truncata, callo albo crassiusculo, superne labro juncto, induta; labrum in medio prominens, supra valde sinuatum, infra sinum leviter incrassatum. Longit. 5½ mm., diam. 1⅓; apertura 1⅓ longa, 1 lata.

The slender costæ, being produced above, give the suture a crenulated appearance, and below, as a rule, they do not extend quite across the whorls. The columellar callus is very thick, the upper part almost forming a tubercle.

5. Opeas subula (Pfeiffer).

Bulimus subula, Pfeiffer, Mon. Hel., vol. 2, p. 158; Reeve, Conch. Icon., pl. lxix., fig. 494.

Opeas subula, Binney, Land and Freshwater Shells of N. America, part i., p. 230, fig. 392; Smith, P. Malac. Soc. London, vol. 1, p. 317; Crosse and Fischer, J. Conchyl., 1863, p. 361, pl. xiv., fig. 6.

Hab.: Cuba, Porto Rico, St. Thomas, Antigua, Grenada, Barbados, Florida, Mexico, Venezuela, Fernando Noronha, Borneo, Cochin China, etc.: Trinidad (coll. Ponsonby).

6. Opeas goodalli (Miller).

Bulimus goodalli, Pfeiffer, Mon. Hel., vol. 2, p. 159; Reeve, Conch. Icon., fig. 621; Gray, Turton's Man. Land and Freshwater Shells, 1840, pl. vi., fig. 61.

HAB.: Cuba, Jamaica, St. Thomas, St. Vincent and some other islands; also Brazil, Fernando Noronha, Venezuela, Colombia, Bolivia: Trinidad (coll. Ponsonby).

7. Succinea pusilla, Pfeiffer.

Succinea pusilla, Pfeiffer, Conch. Cab., ed. 2, p. 53, pl. v., figs. 27–29; Sowerby, Conch. Icon., vol. 18, fig. 35 (enlarged).

HAB.: Ceara, S. America; Guayaquil; Union Island, Grenadines; Trinidad (coll. Ponsonby and Brit. Mus.).

8. Veronicella sp?

Cockerell, Journ. Malacol, vol. 6, p. 5.

HAB.: Caparo, Trinidad (Mr. Urich). Supposed to be a new species.

9. Auricula pellucens, Menke.

Auricula pellucens, Menke, Synopsis, p. 72; Küster, Conch. Cab., Auriculacea, p. 17, pl. ii., figs. 16, 17; Crosse, J. Conchyl., 1890, p. 49; Pfeiffer, Mon. Auric., p. 137 (partim).

Autonoe riparia, Guppy, Proc. Sci. Assoc. Trinidad, 1868, p. 244, 1872, p. 23; Amer. Journ. Conch., 1871, vol. 6, p. 306, pl. 17, fig. 1; J. Conch., vol. 7, p. 231, 1894.

This species was omitted by Mr. Guppy from his latest list of the land and freshwater mollusca of Trinidad, because, having obtained only a single specimen, he appears to have regarded it as an accidental introduction. As it has again been discovered by Mr. Lunt, until proved to the contrary, it should be regarded as belonging to the indigenous fauna. None of the four specimens sent by Mr. Lunt, nor that described by Mr. Guppy, are as large as Menke's type from Demerara. The shell is very thin, glossy, and sculptured with only fine curved striæ of growth, which distinguish it from the adult form of *A. tornatelliformis* and some other allied species from the old world, which are characterized by a very fine granular surface. I have never seen the young of these species which are possibly smooth, like the Trinidad specimens, all of which, on account of the thinness of the outer lip, have an immature look.

APPENDIX.

The young shell of *Streptaxis deformis*[2] is so unlike the adult that it seems advisable to call attention to the fact by giving a figure of it. At this age it might easily be mistaken for a species of *Vitrea*. The specimen figured (fig. 5, 6) consists of $4\frac{1}{2}$ whorls and is 4 mm. in diameter.

(2) No. 27 in list, *J. Conch.*, vol. 8, p. 244.

THE MARINE MOLLUSCA OF MADRAS AND THE IMMEDIATE NEIGHBOURHOOD.

By J. COSMO MELVILL and R. STANDEN.

(Read before the Society, Oct. 13th, 1897.)

A few years ago Professor J. R. Henderson, of the Christian College, Madras, handed over the mollusca obtained during two or three dredging expeditions, in the neighbourhood of that city, to the Manchester Museum for investigation.

Want of time and pressure of other matters have, till now, prevented our accomplishing this, but we now have the pleasure of detailing the results of our examination of this very interesting collection.

As might be expected, the fauna is typically Indian, a few species showing considerable extension of range southwards, which have been till now mainly considered inhabitants of the North Indian Ocean or the Arabian Sea.

So far as we can make out, but few collections of marine shells from Madras have been formed, still fewer catalogued. That published of the contents of the Madras Museum embraces specimens from other localities as well, so that we believe the present is the first endeavour to collate such a list.

There is a large assemblage of dredged material in the British Museum, mainly collected by Mr. Edgar Thurston, Superintendent of the Madras Museum, but this has not yet been investigated.

These facts render the accompanying enumeration of greater interest than a mere list of names usually possesses.

We have thought it worth while to add to each species a note regarding its geographical distribution, and, we may remark, it is astonishing to find how very widely distributed many species are, *e.g.*, *Strombus floridus*, *S. gibberulus*, *Nerita polita*, etc. The majority of the mollusca named come from Madras and its immediately neighbouring shores, but a few were dredged in the Pamban Passage, between Port Lorne, S.E. India, and Rameswaram Island, N.W. Ceylon.

We take this opportunity of expressing our acknowledgements to Prof. Henderson for the opportunity of examining such rich and well-collected material, and we are also much indebted to Mr. Edgar A. Smith, F.Z.S., for having personally aided us in the comparison and differentiation of some obscure species; and, whilst we have left, as still doubtful, several of these, we have ventured to describe seven as new in the present paper.

The total number now catalogued comes just short of 400 species, and is therefore slightly in excess of those enumerated, three years ago, as natives of Bombay by Mr. Alexander Abercrombie and one of

the present authors.[1] We should be inclined to estimate the probable total of both Madras and Bombay marine mollusca, severally, as about the same, say, 700 species or so. Both localities possess many points in common.

An asterisk (*) is appended to all those forms which are included in the Bombay catalogue just alluded to.

(I). DESCRIPTIONS OF NEW SPECIES.

Cerithium carnaticum n. sp. (Plate I., fig. 1).

C. testa attenuato-fusiformi, solida, sordidè ochracea, interdum castaneo-variegata; anfractibus novem, inæqualiter varicosis, ad suturas superficialiter canaliculatis, longitudinaliter irregulariter costatis; costis rudibus, undique transversim rudi-liratis; junctura costarum lirarumque sæpe gemmulatis; apertura ovata, labro extus effuso, paullum incrassato; canali brevi. Long. 13, *lat.* 5 *mm., sp. maj.*

It is curious that this *Cerithium* has not been described ere this, for unnamed examples exist in the British Museum. Its affinities would appear centred near *C. adenense* Sow. (which, however, is much larger) and its allies.

It is a rudely-sculptured species, solid, nine-whorled, attenuate, so impressed at the sutures as to appear channelled; the unequal varices and the irregular longitudinal ribs are crossed by thick liræ, and at the junction of these shining papillæ occur. Mouth ovate, outer lip effuse, a little thickened, canal short.

Colina selecta n. sp. (Plate I., fig. 2).

C. testa fusiformi, cylindrica, attenuata, solidiuscula, cinereo-brunnea; anfractibus undecim, apud suturas paullum impressis, undique transversim arctè sulculosis; sulcis impresso-punctatis; ultimo anfractu producto; apertura rotunda, labro exteriore effuso, incrassato, intus castaneo-lineato. Long. 15, *lat.* 4 *mm.*

Allied to *C. pinguis* A. Ad., the typical form of which is from the Cape, while varieties occur in various tropical regions, *e.g.*, Lifu and the Paumotu Is. Our species resembles more *C. tæniatum* Sow., but is not so pupiform in shape, nor is it noduled transversely. After examination of all forms of *C. pinguis* and allies, we have come to the conclusion that this is distinct from any. It is an elegant shell, and of marked peculiarity in appearance.

Rissoina (Morchiella) thaumasia n. sp. (Pl. I., fig. 3).

R. testa fusiformi, versus apicem attenuata, solida, ochraceo-alba; anfractibus novem, turritis, apud suturas paullum canaliculatis, septem superioribus profundè decussatis; costis longitudinalibus prominentibus, interstitiis quasi-punctatis; anfractu penultimo et ultimo distinctè transversim acutiliratis; costis longitudinalibus ferè evanidis; apertura obliqua; labro exteriore multum incrassato. Long. 5, *lat.* 1·50 *mm.*

1 *Mem. Manchester Soc.*, ser. 4, vol. 7, p. 17–51, 1893.

A beautifully sculptured *Rissoina*, allied, of course, to *R. antoni* Schwag., *R. spirata* Sow., etc., but differing from all in the decussate and strongly longitudinally ribbed sculpture of the seven upper, and in the acutely carinate transverse liræ of the two last whorls. The mouth is oblique, outer lip extremely thickened. There is one specimen in this collection and three, precisely similar, unnamed in the British Museum, also from Madras (coll. Thurston). θαυμάσιος, wonderful.

Syrnola maderaspatana n. sp. (Pl. I., fig. 4).

S. testa fusiformi, versus apicem multum attenuata, perlævi; anfractibus quatuordecim, apicali incluso, vitreo, pellucido, cæteris ad suturas canaliculatis, pallidissimè ochraceo-vinctis, apud suturas utrinque pellucide albo-ligatis; ultimo anfractu ad peripheriam sub lente ochracea linea succincto; apertura oblonga; labro recto, marginem apud columellarem paullum reflexo, uniplicato. Long. 10, *lat.* 2·50 *mm.*

An interesting shell, which at first gave difficulty as to precise location. Had no plait been present, we should have deemed it a *Eulimella*; it is nearer in facies to an *Obeliscus* than a *Syrnola*, but its distinct columellar plait places it in the latter genus. At first we compared it with *Obeliscus turritus* Ad., but the mouth processes are altogether different. The apex is in very perfect condition, and shows a translucent bulbosity.

Turbonilla coromandelica n. sp. (Pl. I., fig. 5).

T. testa pergracili, multum attenuata, albida, pellucida, delicatula; apice heterostropho vitreo; anfractibus quindecim, ventricosulis, undique longitudinaliter arctè recticostatis; interstitiis lævibus, nitidis; apertura trapezoide; labro extus tenui, simplice, columellarem apud marginem paullum reflexo. Long. 7, *lat.* 1·50 *mm.*

Many examples of an exceedingly graceful, attenuate, shining-white *Turbonilla*, which does not correspond with any example in the British Museum collections, nor have we seen it described or figured in any monograph. It does not approach any species nearly that we are cognizant of, the whorls being fifteen in number, delicate, pellucid, ventricosely tumid, shining, closely longitudinally straightly ribbed, the interstices being quite smooth, mouth unequally square, outer lip thin, simple, and slightly reflexed at the columellar margin.

Cadulus anguidens n. sp. (Pl. I., fig. 6).

C. testa paullum arcuata, apud apicem attenuata, pellucidè albida; apertura rotundo-ovata, margine obliquo; apertura posteriore parvo, rotundo, simplici, teuui. Long. 8, *diam. oris* 1, *apicalis* 0·50 *mm.*

A graceful attenuate slightly arcuate *Cadulus*, gradually increasing in diameter till the oblique aperture is reached. The shell is subpellucid, white, quite smooth, posterior or apical orifice minute, simple, round, thin, the mouth being roundly-ovate, with very oblique margin. Two specimens, differing from any in the National collection.

Sanguinolaria hendersoni n. sp. (Pl. I., fig. 7).

S. testa tenui, ferè lævi, subnitida, obscurè concentricè inæqualiter striata; valvis posticè et anticè paullulum hiulcis; margine postico subtrapezoide, paullum producto; antico prolongato, rotundato, ventrali rectiusculo; dorsali leniter utrinque declivi; umbonibus lævibus, roseis, cætera superficie pallidè rosea. Long. 23, *lat.* 35 *mm.*

A beautiful addition to a circumscribed genus. To no known species does it nearly assimilate, save in colour, coming perhaps nearest to the West Indian *S. sanguinolenta* Gm., which, however, is far more produced and gaping posteriorly. The type, from Mr. Henderson's collection, is of the dimensions given above, but three other specimens, smaller but quite perfect (long. 20, lat. 32 mm.) exist in J. C. Melvill's collection, which were obtained at a sale at Stevens' auction rooms, in Dec., 1866, without label of locality. We have much pleasure in naming this species after its discoverer.

(II.) GENERAL CATALOGUE.

We have carefully compared the following list with that[1] compiled by Mr. Edgar Thurston, C.M.Z.S., Superintendent of the Madras Government Museum, when investigating the Zoology of Rámésvaram Island, and the Gulf of Manaar, Ceylon, and find 106 species in common. Probably the very few of Mr. J. R. Henderson's Mollusca collected at Pámban, were obtained about the same time as Mr. Thurston's; the majority gathered 250 miles further north show on the whole a great dissimilarity.

Mr. Thurston's catalogue enumerates about 425 Marine Mollusca, inclusive of a few brackish water or fluviatile forms, such as *Tympanotonos*, *Potamides*, and *Melaniæ*, from Pámban and Tuticorin, which we have not mentioned though they occurred in Mr. Henderson's gatherings. Like ourselves, he has not attempted differentiation of the Chitonidæ. Our two species, both small and insignificant, are probably new, for as Mr. E. R. Sykes informs us, no Chitonidæ are yet recorded from Madras.

Amongst Mr. Thurston's more interesting records we note *Conus longurionis* Kien., which has lately occurred on the Malabar Coast (Townsend), *C. peplum* Chemn., from Muttuwartu; *Mitra zebuensis* Rv., from the same place, this being one of the finest of the genus, also *M. acupicta* Rv., *Cypræa lentiginosa* L. (also found along the whole W. Coast of Hindustan) *Pterocera scorpio* L., *Ovulum formosum* Ad. Rv., and others. We should hope that many of these will ultimately be found to reach the vicinity of Madras.

That portion of Mr. Thurston's preface which gives a glimpse of the appearance of the Madras coasts, is interesting, and well worth

1 *Bull. Mus. Madras*, No. 3, 1895.

quoting here. He says (*l.c.*, p. 79) :—"A casual observer walking along the sandy, surf-beaten beach at Madras, will probably find nothing to attract his attention excepting a number of coarse shells destined for the manufacture of chunám (lime), an occasional flattened jelly-fish, and swift-footed crabs (Ocypoda), which on the approach of man, scamper away, and disappear like rabbits into their burrows. But if the same observer walks along the shore at Pámban, he cannot help noticing that it is strewn with broken fragments of dead coral, among which branches of madrepore are most conspicuous ; and sponges washed on shore by a recent tide, or dried up above water mark. And if he trusts himself upon the slimy blocks of coral which are exposed at low tide, and turns them over so as to display their under-surface, he will find there a wealth of marine life, crabs, boring anemones, annelides, shell-fish, trepangs, (bêches-de-mer), and bright-coloured encrusting sponges. And the Madras beach may, allowing for differences of species, be taken as fairly representative of the coast of the Presidency, with the exception of the coral-fringed shores of the islands which skirt the coast of the Gulf of Manaar."

Class GASTROPODA.

Order OPISTHOBRANCHIATA.

Family *BULLIDÆ.*

Bulla ampulla L.—Rather small specimens. Philippines.

Family *RINGICULIDÆ.*

Ringicula propinquans Hinds*—Five or six, quite normal. Philippines.

Order PROSOBRANCHIATA.

Family *TEREBRIDÆ.*

Terebra (Euterebra) eximia Dh.—Exclusive of the new species, this is the most interesting shell in the collection. It is the second known specimen only, the type[1] in Mus. Deshayes being equally finely marked but smaller, ours measuring 48 mm. The sculpture is peculiar and very beautiful.

Terebra (Euterebra) marmorata Dh. (Pl. I., fig. 8).—Many typical examples. Australia.

Terebra (Euterebra) similis E. Sm.—Described[2] from a unique individual, this being bleached. The two before us from Madras, and one from Karachi (Townsend coll.), were dredged living, are pale ochraceous yellow to fawn colour, and exhibit the characteristic sculpture. The locality having been hitherto unknown makes the discovery of these specimens of unusual interest.

1 Reeve, Conch. Icon., Plate xxi., fig. 106.
2 *Ann. and Mag. Nat. Hist.* (4) vol. 11, 1873, p. 265.

Terebra (Subula) crenulata L.—Several. A widely distributed species extending from the Indian Ocean to Central Polynesia.

Terebra (Subula) dimidiata L.—Common. It is also found at Singapore, Philippines, and Central Polynesia.

Terebra (Subula) duplicata Lm.—In all stages of growth. A very common Indian Ocean form. Zanzibar, Madagascar, Moluccas, Singapore, China, to Fiji Islands.

Terebra (Abretia) cerithina Lm.—A few typical specimens. Also occurs from Philippines to Society Islands.

Terebra (Abretia) tenera Hinds.*—One only, but perfect and a match for Bombay and Ceylonese specimens, with which we have compared it. Ceylon and Straits of Malacca.

Terebra (Hastula) aciculina Rv.—Three specimens. The smaller size, colour, longer plications, and broad base distinguish this species from *T. cinerea* Born, with which it is often confounded. It occurs at Singapore, Manila, Marquesas, and Sandwich Islands.

Terebra (Hastula) strigilata L.—Also from Polynesia and Sandwich Islands.

Terebra (Myurella) cingulifera Lm.—Typical. Also recorded from Philippines, New Ireland, Lifu, Fiji, and China.

Terebra (Myurella) monilis Quoy.—Several. According to Tryon this is but a synonym of *T. straminea* Gray. Philippines, China.

Terebra (Myurella) myuros Lm.—Two examples of this well known species, which also occurs at Moluccas, Lifu, and New Ireland.

Terebra (Myurella) persica E. Sm.—Very beautiful, being highly chased and shining, though much grooved and latticed. A remarkable extension of its range as hitherto recognised. Persian Gulf.

Terebra (Myurella) *cf.* **turrita** Dkr.—An interesting little form, which may be distinct, but there is only one specimen, so it is hard to come to a satisfactory conclusion on the subject.

Terebra (Myurella) undulata Gr.—Also recorded from Philippines and Fiji.

FAMILY *CONIDÆ*

Conus mutabilis Chemn.*—Red Sea, St. Domingo, China.

Conus (Coronaxis) hebraeus L.—Widely distributed. East Africa, Ceylon, Mauritius, Japan, Philippines, New Caledonia to Fiji.

Conus (Coronaxis) pusillus Chemn.—A pretty little shell, which Tryon places as a variety of *C. ceylonensis* Hwass. Red Sea,

Ceylon, West Africa, Mauritius, Australia, New Caledonia, Sandwich Islands, Mazatlan, Cape St. Lucas.

Conus (Coronaxis) vermiculatus Lm. (=*C. hebræus* L. var.)

Conus (Nubecula) gubernator Hwass. — A well known species, occurring also at Ceylon, Madagascar, Mauritius, Philippines, New Caledonia, and Seychelles Islands.

Conus (Dendroconus) betulinus L.—Two examples. This species also occurs in East Africa, Isle of Bourbon, Java, Ceylon, China, and Philippines.

Conus (Dendroconus) figulinus L.—Also from Amboyna, Java, Ceylon, New Caledonia, Lifu, and Philippines.

Conus (Dendroconus) ponderosus Beck. (=*C. quercinus* Hwass var.?)— Our specimens are old and heavy, without the revolving lines which characterise *C. quercinus*; Tryon places them together, but we have always considered them distinct. Red Sea, East Africa, Ceylon, Mauritius, Philippines, Fiji, and Sandwich Islands.

Conus (Leptoconus) amadis Martini. — Small specimens. Ceylon, Java, New Caledonia, Polynesia.

Conus (Leptoconus) generalis L.—Of ordinary character. Also recorded from Ceylon, Red Sea, Isle of Bourbon, East Africa, East Indies, Philippines, Lifu, and New Caledonia.

Conus (Rhizoconus) capitaneus L.—Quite typical. Philippines, Ceylon, Australia, Lifu, Polynesia, Mauritius.

Conus (Rhizoconus) lineatus Chemn.—A well known species, with a wide distribution. Red Sea, East Africa, Ceylon, Philippines, Australia, Lifu.

Conus (Rhizoconus) lithoglyphus Meuschen. — Also from Ceylon, Philippines, and Lifu.

Conus (Rhizoconus) magus L.—Typical. Madagascar, Borneo, Lifu, Philippines.

Conus (Rhizoconus) mustelinus Hwass.—Mauritius, Ceylon.

Conus (Rhizoconus) punctatus Sow. — Small specimens. Guinea, Ceylon, Moluccas, West Indies.

Conus (Rhizoconus) senator L. — Tryon considers this a synonym of *C. planorbis* Born, stating that the description in the 'Systema Naturæ' shows the identification of *C. senator* to be wrong, and Hanley was unable to find it in the Linnean Collection. Mauritius, Ceylon, New Caledonia, Philippines.

Conus (Rhizoconus) vexillum Gm. — Also recorded from Mauritius, Ceylon, Java, Philippines, Lifu, and Samoan Islands.

Conus (Lithoconus) virgo L.—Typical. Red Sea, East Africa, Ceylon, Philippines, New Caledonia, Polynesia.

Conus (Chelyconus) adansoni Lm.—According to Tryon, this is but a variety of *C. mediterraneus* Hwass, "Shell more cylindrical." It occurs likewise at Senegal.

Conus (Cylinder) omaria Hwass.—Typical. Red Sea, Ceylon, Philippines, Australia, Polynesia.

Conus (Hermes) nussatella L. — Small, typically marked specimens. Red Sea, East Africa, Ceylon, Java, Philippines, North Australia, Lifu, Polynesia.

Pleurotoma amicta E. Sm.* — Also common at Bombay. Described originally from the Sandwich Islands.

Pleurotoma (Surcula) tornata Dillw.—Generally known as *P. javana* L.; but that author's description is of a ribbed shell, better known as *P. nodifera* Lm., which this is not. One example, and that a fine albino. Also from Java and East Indies.

Pleurotoma (Turris) marmorata Lm.—Five, in good condition. Red Sea, Malacca, Japan, Australia, Polynesia.

Pleurotoma (Turris) variegata Kien.—Two, well marked. Indian Ocean, Japan, Philippines.

Pleurotoma (Gemmula) ceylonica E. Sm.—Characteristic, but imperfect at the mouth.

Pleurotoma (Gemmula) multiseriata E. Sm.—Two shells, both in fine condition, and better than the type. There is considerable resemblance between this and one or two of the Eocene species from Barton. Ceylon, Persian Gulf, China Sea.

Pleurotoma (Drillia) crenularis Lm. — Four, all typical. Bombay, Tranquebar, Singapore, Australia.

Pleurotoma (Drillia) major Gr.—Three specimens of a very distinct species, the habitat of which has, apparently, hitherto been unknown.

Pleurotoma (Drillia) nodifera Pease.—Many, all typical and fine. Recorded from the Sandwich Islands.

Pleurotoma (Drillia) regia Beck.—Similar to Lifu examples. Also recorded from Amboina and Moluccas.

Pleurotoma (Drillia) tayloriana Rv.—This, and *P. major* Gr., are perhaps only forms of *P. crenularis*, but are very distinct, and always recognizable. Bombay, Tranquebar, Singapore, Australia.

Pleurotoma (Clavus) echinata Lm. — Fine, quite typical. West Coast of Africa.

Mangilia horneana E. Sm.—We suspect this little Pleurotomid has a wide range, as it occurs at Bombay, though not catalogued in the last list of the molluscan fauna of that region, and Karachi also (Townsend). It has some superficial resemblance to our *M. himerodes* from Lifu,[1] but is quite distinct.

Mangilia (Cythara) cithara A. Gd. — One typical example. Fiji (Gould), Paumotu Islands (Pease), Lifu (Hadfield).

Mangilia (Cythara) fusiformis Rv.—One example only, but that in superior condition; ochraceous brown, obliquely longitudinally ribbed, and transversely lirate, the interstices being much minutely and exquisitely longitudinally striate. Philippines.

Clathurella nexa Rv. — Identical with Bombay specimens. Samoa, Lifu, Philippines, Fiji Islands.

FAMILY *CANCELLARIIDÆ*.

Cancellaria (Merica) melanostoma Sow.—One, very perfect. A rare form. China, Japan, Philippines.

Cancellaria (Trigonostoma) articularis Sow. (=*C. scalata* Sow.) Red Sea, Ceylon, Mauritius, Moluccas, New Caledonia.

Cancellaria (Trigonostoma) crenifera Sow. — Not quite typical. Also occurs at the Philippines.

Cancellaria (Trigonostoma) scalarina Lm.*—Perfect, but smaller than the ordinary form, from which they also differ in being more deeply coloured, and darker at the aperture. Mauritius.

FAMILY *OLIVIDÆ*.

Oliva (Strephona) gibbosa Lm.—Common. Ceylon, West Africa.

Oliva (Strephona) ispidula L.—In the usual variety. Philippines, Fiji and Loyalty Islands.

Oliva (Strephona) maura Lm.—Present only as var. *sepulchralis* Lm.

Oliva (Strephona) tricolor Lm. — We consider this species distinct from *O. elegans*, with which it is associated by Tryon.

Agaronia nebulosa Lm.*—In all stages of growth. Ceylon, West Africa.

Ancilla (Ancillaria) ampla Gm.—Some pretty specimens. Red Sea, Ceylon, Mauritius, Philippines.

Ancilla (Ancillaria) crassa Sow.—One poor example. Red Sea.

1 *J. Conch.*, vol. 8, p. 281, pl. ix., fig. 16, 1896.

FAMILY *HARPIDÆ*.

Harpa conoidalis Lm.*— Three; one typical, two juvenile, approaching the var. *striatula*. It is hard to distinguish where *H. conoidalis* begins and *H. articularis* Lm. ends. Ceylon, Philippines, Mauritius.

Harpa minor Rumph.—One, full grown. Indian Ocean, South Africa, Madagascar, Fiji and Loyalty Islands.

FAMILY *MARGINELLIDÆ*.

Marginella (Volutella) angustata Sow. — Very large, the markings more or less covered by callosities; the ordinary form likewise occurring. Ceylon, Australia.

Marginella *cf.* **shoplandi** Melv.—Three, which though dead, much resemble a new species from Karachi and the Persian Gulf.[1] When in perfect condition it is transparent and exceedingly polished and shining.

Marginella (Cryptospira) quinqueplicata Lm. — Beautiful specimens. Bay of Bengal, Sumatra, Malacca.

Marginella (Gibberula) monilis L.—Two specimens. Senegal, Red Sea, Island of Socotra.

FAMILY *VOLUTIDÆ*

Voluta (Aulica) vespertilio L. — Small ordinary specimens. Philippines, Moluccas.

FAMILY *MITRIDÆ*.

Mitra episcopalis L. — Several, adult and young. Ceylon, Philippines, Polynesia.

Mitra (Scabricula) crenifera Lm.—An ovate variety, prettily marked. Mauritius, Manila, Red Sea, Indian Ocean.

Mitra (Cancilla) interlirata Rv.—Four, typical. Placed by Tryon as a synonym of *M. flammea* Quoy, but sufficiently distinct, in our opinion. China, Philippines, Australia, Polynesia, Sandwich Is.

Mitra (Mitreola) litterata Lm.—A few small specimens of ordinary form. Red Sea, Java, Mauritius, South Africa, Philippines, Loyalty Islands.

Mitra (Costellaria) crebrilirata Sow.—Eight, showing some variation in size, and varying in colour from ochraceous to leaden grey. Indian Ocean, Japan, Philippines, Polynesia.

FAMILY *FASCIOLARIIDÆ*.

Fusus longicauda Bory.—A common East Indian species, at one time confused with *F. colus* Lm. Ceylon.

1 *Manchester Memoirs*, vol. 41, no. 7, p. 8, 1897.

Fusus forceps Perry.—This shell which is more usually known as *F. turricula* Kien., is smaller than *F. longicauda* Bory, and ribbed on the body whorl, the interstices being darker. China.

Fasciolaria filamentosa Lm.—A prettily-coloured small variety. Red Sea, Ceylon, Philippines, Australia, Loyalty Islands, Central Polynesia.

Latirus (Peristernia) pulchellus Rv.—Two, small, but highly coloured, the pale pink mouth being characteristic. The columella of this *Peristernia* does not possess folds, at all events, externally, thus separating it from others of the genus. Zanzibar, New Caledonia.

FAMILY *TURBINELLIDÆ.*

Cynodonta turbinella L. (=*C. cornigera* Lm.)—The spines are unusually well developed. Red Sea, Moluccas, Philippines, Mauritius, Central Polynesia.

Pyrella spirillus L.—Four, one in very young state, showing a very bulbous apex. Tranquebar.

Ficula ficus L. (=*F. lævigatus* Rv.)—Many, all the ordinary form. Red Sea, Indian Ocean, Singapore.

Ficula reticulata Lm. — Typical examples. Sooloo Archipelago, Indian Ocean, East Indies, Japan.

Rapella (Melongena) paradisiaca Rv.— Shewing some variation. Ceylon, Red Sea, Mozambique, Natal.

Rapella (Melongena) pugilina Born. — Quite young, but unmistakeable. Indian Ocean.

Hemifusus lacteus Rv.—Two of this rare form. Philippines.

FAMILY *BUCCINIDÆ.*

Cyllene fuscata A. Ad.*—Also from Malacca and Singapore. According to Tryon this is a synonym of *C. lugubris* Ad. Rv.

Pisania spiralis Gr.*—Several. Mauritius.

Tritonidea tranquebarica Gm.—Several specimens.

Tritonidea undosa L.—Fine, with operculum. Malacca, Australia, Philippines, Fiji, Paumotus, and Loyalty Islands.

Engina armillata Rv.—A very fine shell, in a beautiful state of preservation. Philippines, Arakan.

Engina pulchra Rv.—One, of the pale white wreathed variety. Panama, Galapagos, and Loyalty Islands.

Nassaria suturalis A. Ad.* (= *N. acuminata* Rv.)—Five; this *Nassaria* seems generally, but sparsely, distributed from Karachi through Bombay and Ratnagiri to the Laccadives and Ceylon, and now found in Madras. China Sea, Indian Ocean.

Latrunculus[1] **spiratus** Lm.*—Several, one operculated. Ceylon, Philippines.

Latrunculus zeylanica Brug. — Several, of ordinary form. Ceylon.

FAMILY *NASSIDÆ*.

Nassa (Arcularia) callosa A. Ad.—Very finely grown, showing the white callosity at the mouth. Philippines, Indian Ocean, Lifu.

Nassa (Arcularia) labecula A. Ad. (=*N. jonasi* Dk.)—This may be only a variety of the preceding species, from which it is distinguished principally by form and sculpture. Port Jackson, Australia.

Nassa (Arcularia) leptospira A. Ad.—Quite typical. Philippines (Cuming), Japan, Ascension Island (Pease).

Nassa (Alectryon) monile Kien.—A very handsome variety. Philippines, Australia, Central Polynesia, Lifu (Hadfield).

Nassa (Alectryon) mucronata A. Ad. (=*N. monile* Kien. var.*) —Very fine, in better condition than our Bombay examples. Loyalty Islands, Australia, Philippines.

Nassa (Alectryon) scalaris A. Ad.—Our specimens possess some of the characters of *N. monile* and *N. papillosa*. Philippines (Cuming).

Nassa (Niotha) splendidula Dkr.—Only one of this choice shell, which appears almost typical. A brightly banded and highly sculptured *Nassa*, in shape like a small *N. stigmaria*. Philippines, Malacca, Lifu, Polynesia.

Nassa (Niotha) stigmaria A. Ad.—The typical form, which comes near *N. reticosa* A. Ad., *N. candens* Hinds, and *N. cremata* Hinds, all high-class *Nassæ*, with elaborate sculpture. Varieties of this species occur throughout the Indian Seas, and are especially frequent in the Andaman Isles. Philippines, Malacca.

Nassa (Hima) plebecula A. Gd. — One, undoubtedly this species, which Tryon unites with *N. paupera* A. Gd. Japan, Australia, Lifu (Hadfield).

Nassa (Hima) stolata Gm.—Many, varying in size and form. Some are elongate, others ventricose and more robust, shewing the same form that occurs so plentifully on the western and southern shores of India. More generally known by the now superseded name *ornata* Kien.

Nassa (Zeuxis) canaliculata Lm.— Many, very handsome, well developed, and rich in colour, varying from orange-brown to grey. Philippines, Polynesia.

1 It is with regret that the familiar name *Eburna* Lm. can no longer be used, having been employed twice by that author—firstly, as a synonym of *Ancilla* Lm. in 1801, and subsequently (1822) applied to the old *Buccinum spiratum* L. and its allies.

Bullia (Dorsanum) belangeri Kien.*—Many very fine living examples. Arakan, Ceylon.

Bullia (Dorsanum) cumingiana Dkr.—Two, evidently of this species, the habitat of which is unrecorded.

Bullia (Dorsanum) livida Rv.—Two, fine examples.

Bullia (Dorsanum) vittata L.—Many, some albino, fine living shells. Ceylon, Zanzibar.

FAMILY *COLUMBELLIDÆ*.

Columbella (Mitrella) euterpe Melv.*—Many examples, agreeing precisely with the original description, the types having been unfortunately mislaid.

Columbella (Mitrella) flavilinea Melv.*—Three specimens.

Columbella (Nitidella) ala-perdicis Rv. (=*C. lævigata* L. var.) Two, in young condition. West Indies.

Columbella (Anachis) terpsichore Leathes.*—Found both in the Eastern and Western Hemisphere. One specimen, but large and in fine condition. West Indies.

Columbella (Pygmæa) flavida Lm.—Synonymous with *C. flava* Brug. Indian Ocean, Japan, Mauritius, Seychelles, New Caledonia, Polynesia.

Columbella (Pygmæa) versicolor Sow.—A variable species, of wide distribution, and with—according to Tryon—a long array of synonyms. The oldest name for this species is *C. scripta* Lm., but Linnæus had previously used this name for a well-known Mediterranean species. Indian Ocean, Japan, Philippines, Australia, Polynesia.

FAMILY *MURICIDÆ*.

Murex brevispina Lm.—Quite typical. Red Sea, Indian Ocean, South Africa, North Australia.

Murex tribulus L.*—Several. Owing to the shortness of the spines, and the variable transverse nodulosities on the last whorls, we should consider our specimens as coming under the var. or subspecies *M. tenuispina* Lm. We cannot see our way to allow true specific rank to this ancient species.

Murex (Haustellum) haustellum L.—One only, but fine. Ceylon, Indian Seas, Red Sea, China, Mauritius, Philippines.

Murex (Chicoreus) microphyllus Lm.—Large, and in fine condition. Ceylon, Indian Ocean.

Murex (Ocinebra) contractus Rv.—Exactly corresponding with Bombay examples. New Caledonia, Philippines, Fiji Islands.

Murex (Phyllonotus) anguliferus Lm.—In all stages of growth. Red Sea, Indian Ocean, Seychelles, Isle of Reunion.

Rapana bezoar L.—One specimen, of the typical ribbed form, in fine condition. China, Japan, Philippines.

Rapana bulbosa Soland.—Many, very fine, and in all stages of growth, with opercula. China, Japan, Philippines.

Purpura rudolphi Lm.—Hardly typical, and somewhat juvenile, but strongly filletted and well marked. Philippines.

Purpura tissoti Petit.* — Identical with Bombay examples. The late Mr. Tryon's remarks as to this species[1] prove that he did not know it, and that Mr. Swift, whom he quotes, was also misled into considering it a var. of the West Indian *Cantharus coromandelianus* Lm.

Purpura (Stramonita) bufo Lm.*—Many specimens in every stage of growth, with opercula, and showing some variety. Philippines.

Purpura (Polytropa) sacellum Chemn.*—Also common at Bombay. Many, both young and mature.

Purpura (Cronia) amygdala Kien.—Typical; the close ribs thickly covered over with small arched scales. Australia.

Sistrum iostoma Rv.—Quite typical. The habitat of this species is hitherto unrecorded.

Sistrum konkanense Melv.*—Described as a *Ricinula*, but *Sistrum* has priority. The range of this species, it is interesting to observe, is being gradually extended both north to Karachi, and south to Ceylon, and eastward. The example before us is hardly typical, being not so elongate as the Bombay shells.

Sistrum margariticolum Brod.—Several of a shell which has not been fully understood by students till recently, but which, in our opinion, is a good species. Mauritius, Loyalty Islands, Australia.

Sistrum tuberculatum Blainv.*—Common and very variable. The animal is described by Gould in the "Mollusca" of the Wilkes' Expedition as being deep grass-green, with the mantle, locomotive disc, and tentacles light sea-green, finely dotted with white. Japan, Philippines, to Sandwich Islands.

Sistrum undatum Chemn.—Several typical examples. Tranquebar, Natal, China, Japan, Australia, Polynesia to Paumotu Islands.

FAMILY *TRITONIDÆ*.

Aquillus chemnitzi Gr. (=*A. tranquebaricus* Lm.)—Some small specimens. Panama, West Coast of Africa, West Indies. We consider *Aquillus* has precedence of other names proposed for this genus, and is not too like *Aquila* in ornithology to be discarded in consequence of such similarity; doubtless the derivation was from 'aqua,' water.

1 Man. Conch., vol. 7, p. 164, under *Cantharus*.

Aquillus (Lotorium) lotorium L. — A common Ceylonese species. Red Sea, Indian Ocean, Philippines, Central Polynesia.

Aquillus (Simpulum) aquatilis Rv.*—One, exceedingly fine and well marked. Loyalty Islands.

Aquillus (Lotorium) retusus Lm.—Some typical specimens. Indian Ocean, Mauritius.

Aquillus (Lotorium) tripus Chemn.—Small, well-marked specimens. Indian Ocean, China.

Distortrix cancellinus Roissy.—One specimen. Ceylon, China, Philippines, St. Thomas and other West Indian Islands, Monte Christi and Xipixapi, West Columbia.

Gyrineum[1] **crumena** Lm.—Many examples, of ordinary form. Ceylon, Philippines.

Gyrineum (Bursa) margaritula Dh. — Typical examples. Indian Ocean.

Gyrineum (Bursa) spinosa Lm.*—A large number of specimens, in all stages of growth, with opercula. Red Sea, Indian Ocean, Philippines, Mauritius.

Gyrineum (Lampas) affinis Brod. — Several, quite typical. Philippines, Loyalty Islands, Samoa, West Indies.

Gyrineum (Apollon) tuberculata Brod.* — Medium sized specimens. Indian Ocean, Red Sea, China, Malacca, Manila, Tahiti.

FAMILY *CASSIDIDÆ*.

Cassis (Semicassis) canaliculata Lm. — Several examples. Ceylon, Philippines.

Cassis (Semicassis) sulcosa Brug.—Not quite typical; our examples agreeing very well with *C. undulata* Gm., which Tryon considers a variety only. Mediterranean, Portugal, West Coast of Africa, West Indies, Brazil, West Coast of North America from Panama to Guaymas.

Cassis (Phalium) areola L.—Two good specimens. Indian Ocean, Malacca, Philippines, New South Wales.

FAMILY *DOLIIDÆ*.

Dolium chinense Dillw. (=*D. variegatum* Lm. var.)—China, North Australia.

Dolium costatum Mke. — Of ordinary form. East Indies, Philippines, Mauritius.

Dolium fasciatum Brug.—One only, with unusually fine varix. Philippines, China, Japan.

1 The well-known name *Ranella* Lm. (1812) is superseded by *Gyrineum* Link (1807) and *Bufo* Montfort (1810).

Dolium fimbriatum Sow. (=*D. costatum* Mke. var.)—Several small specimens. Senegal, Manila, Japan.

Dolium perdix L.—One specimen of this widely-distributed species. Indian Ocean, Mauritius, Lifu, Polynesia, West Africa, West Indies, Brazil.

FAMILY *CYPRÆIDÆ*.

Simnia sowerbyana Weink.—One, in fine condition, of pale-flesh colour, transversely indistinctly banded with white. This is *Ovula spelta* Sow. & Rv., not Lm. South Seas.

Cypræa (Aricia) annulus L.*

Cypræa (Aricia) arabica L.*

Cypræa (Aricia) caput-serpentis L.

Cypræa (Aricia) moneta L.*

Cypræa (Aricia) reticulata Martyn.—A medium-sized form of var. *intermedia* Gr.

Cypræa (Luponia) errones L.

Cypræa (Luponia) lynx L.

Cypræa (Luponia) ocellata L.*

Cypræa (Luponia) pallida Gr.*—Extremely fine.

Cypræa (Luponia) vitellus L.—With few exceptions, all the above common species are of the most ordinary character, and call for no special comment; they are of the usual types met with on the Indian coasts. Nearly all are widely distributed over the whole Indo-Pacific region.

Erato pellucida Rv.*—A widely-distributed species of *Erato*; we have seen it from the shores of Beluchistan, also Karachi, Bombay, and Ratnagiri.

FAMILY *STROMBIDÆ*.

Strombus lentiginosus L.—Typical. Philippines, Zanzibar, New Caledonia to Fiji.

Strombus (Canarium) urceus L.—Two good specimens, with dark orange-coloured mouth. Indian Ocean, Philippines, Australia.

Strombus (Canarium) gibberulus L.* — Normally-marked examples of this widely-distributed species. Zanzibar, Natal, Red Sea, Indian Ocean, Mauritius, Philippines, Lifu, New Guinea, Fiji and Paumotu Islands.

Strombus (Gallinula) marginatus L.—Several pretty specimens. Formosa, China, Philippines.

Strombus (Gallinula) isabella Lm.—Three, shewing we think peculiarities specific from *S. canarium* L., with which this shell has been united by some authors. The mouth is wider, and the outer

lip more effuse and angular, and not so incrassate; colour a pale unicolorous isabelline yellow, which no doubt suggested to Lamarck the trivial name.

Strombus (Conomurex) luhuanus L.—Three, quite typical. Australia, New Guinea, Philippines, Loyalty and Fiji Islands.

Pterocera (Harpago) chiragra L. — Only in young state. Indian Ocean, Philippines, Loyalty Islands, Polynesia.

Rostellaria curvirostris Lm.—Several, mostly in a young state. Red Sea, Moluccas.

FAMILY *CERITHIIDÆ.*

Cerithium carnaticum M. & S., *vide antea*, p. 31.

Cerithium *cf.* **corallinum** Defr.—Three examples, which we consider very near to, if not identical with, this species.

Cerithium litteratum Born.—Several specimens. West Indies, Florida.

Cerithium morus Lm.—A well-known, variable, and widely-distributed species. Madagascar, Red Sea, Philippines, Australia, Loyalty and Fiji Islands.

Cerithium nodulosum Brug.—One fine specimen. Singapore, Moluccas, Philippines, Lifu (Hadfield).

Cerithium vulgatum Brug.—Some typical examples. There are few shells with such an enormous synonymy of varietal names as this species, although it does not vary more than is usual in the genus. Tryon figures a number of these so-called varieties, but does not recognise their claim to separation from the type. Southern Europe, West Africa, Cape of Good Hope.

Cerithium yerburyi E. Sm.—Allied to *C. morus* L. but more attenuate. Originally described from Aden, but no doubt it will be found all along the Indian Coasts.

Colina macrostoma Hinds.—A very interesting form, of which only one occurred in Prof. Henderson's dredgings. Straits of Malacca, Borneo.

Colina selecta M. & S., *vide antea*, p. 31.

Pyrazus palustris L.—Two, of typical form. India, Java, Australia, Loyalty Islands.

FAMILY *PLANAXIDÆ.*

Planaxis nigra Quoy.—Six, of a plain-coloured, smooth, unpolished shell. New Ireland, Fiji and Sandwich Islands, South Africa.

Planaxis sulcatus L.* — Eighteen, all well grown and unusually large. Indian Ocean, Sandwich Islands, Australia, Philippines, Mauritius, South Africa.

FAMILY *TURRITELLIDÆ*.

Turritella triplicata Stud.—Three, of normal coloration. Mediterranean, West Africa, Canary Islands, Coast of Spain.

Turritella (Haustator) columnaris Kien.—One, in poor condition. Ceylon.

Turritella (Zaria) duplicata L.*—Many, including some perfect and large albino varities ; also var. *β. attenuata* Rv. is present in all stages of growth. Indian Ocean generally.

FAMILY *LITTORINIDÆ*.

Littorina scabra L.—Plentiful, of typical form. Including its varieties, this species stretches nearly round the world, extending from West Africa around to Arabia, but has not yet been found in the Mediterranean Sea. Indian Ocean, China, Fiji, Sandwich, and Philippine Islands, Mazatlan, Florida, Ceylon, Japan, West Coast of Africa, West Indies, Polynesia.

FAMILY *SOLARIIDÆ*.

Solarium delectabile Melv.* — Described in 1893 from Bombay specimens collected by Mr. Abercrombie. Our Madras specimen is unmistakable, though not in prime condition. This discovery extends the range of this very beautiful little *Solarium*, which will probably be found before long distributed around the Indian coasts.

Solarium modestum Phil.—Two pretty specimens. This may, perhaps, be a variety of *S. perspectivum*, from which it differs in the colouring only. Society Islands, China.

Solarium perspectivum L.—One specimen is more conical than usual. It also occurs in *statu juvenili*. Amboyna, Indian and Pacific Oceans, China, to Australia.

Solarium pictum Phil.—One, rather worn. New Guinea.

FAMILY *RISSOIIDÆ*.

Rissoina (Phosinella) deshayesi Schwartz.—With some little diffidence we name our solitary large clathrate *Rissoina* as above. Singapore (in Mus. Brit. unnamed), Philippines.

Rissoina (Phosinella) sp. — To some extent agreeing with Lifu examples of *R. quasillus* M. & S., but coarser in texture. We also have the same form from Thursday Island, sent in shell sand, collected by Mr. Arnold Henn.

Rissoina (Morchiella) thaumasia M. & S., *vide antea*, p. 31.

Fenella cerithina Phil*.—Two, rather worn. A small, prettily decussated species. Mauritius, Island of Rodriguez, Red Sea, Persian Gulf, Japan.

Iravadia trochlearis A. Gd.* –Many, in excellent condition, Evidently abundant throughout the Indian Ocean. We have many specimens from Bombay, and have seen it from Ceylon, Karachi, and Persian Gulf. Japan, Hong Kong.

FAMILY *CAPULIDÆ*.

Amathina tricostata Gm.—Very perfect, though not large. Only one example. East Indies, Japan.

Crucibulum (Dispotæa) extinctorium Lm. (=*C. scutellatum* Gr. var.)—Three, fine. West Indies, Ceylon, West Coast of America from Chili to Mazatlan.

Crepidula (Crypta) scabies Rv.—Many specimens, in good condition. Ceylon, Singapore, China Sea, Japan.

Crepidula (Ergæa) walshi Herm. (=*C. plana* Ad. Rv. var).—Many good and characteristic examples. Abundant also at Bombay. Japan, Singapore, China, Ceylon.

Calyptræa diaphana Rv. (=*Mitrularia equestris* L. var).—Many examples. Tryon has "interpreted this species in accordance with general usage, the Linnæan species being indeterminable." He gives a long synonymic list of forms representing such variety in shape and sculpture, that it is not surprising that they were described as distinct species by the older school of conchologists. China Sea, Philippines, Indian Ocean, Prince's Island, West Africa, West Indies, West Coast of Central America, Galapagos Islands.

Calyptræa fibulata Rv. (=*Mitrularia equestris* L. var.)—Several good examples. Philippines, West Indies.

FAMILY *XENOPHORIDÆ*.

Xenophora solaris L.—One beautiful example. Malacca, Singapore.

FAMILY *LAMELLARIIDÆ*.

Lamellaria perspicua L.—Neither we nor Mr. Edgar Smith can discover any means of differentiating the Madras form from that found in English waters.

FAMILY *NATICIDÆ*.

Natica lineata Lm.*—Medium-sized specimens, of typical form. Singapore, Philippines.

Natica marochiensis Lm. (=*N. maroccana* Chemn.)—The many examples in this collection of a small cinereous shell, quite plain, and concentrically wrinkled in a characteristic manner round the sutures, we cannot exactly identify, but presume it is one of the many forms of Lamarck's protean species. West Africa, West Indies, Panama to Mazatlan, Society and Philippine Islands, Lifu, Australia.

(*To be continued*).

THE LAND AND FRESHWATER MOLLUSCA OF THE DISTRICT BETWEEN ASHTON-UNDER-LYNE AND OLDHAM.

By FRED. TAYLOR.

(Read before the Society, December 8th, 1897).

This district is a long narrow slip of country through the whole length of which flows the river Medlock, one of the main sewers of Oldham. It is hemmed in by the cotton-spinning towns of Ashton-under-Lyne, Oldham, and Mossley, with their adjoining townships, and is probably the smokiest district in the kingdom. From the main valley, branch off several smaller valleys, the most important one being Holden Clough; these valleys are scantily clothed with trees and other vegetation, which is rapidly dying off (even the nettle being now a rare plant), and exposing the ground to the weather; the woods are now series of landslips and swampy places.

At first sight this district appears to be a very poor conchological ground indeed, the carboniferous shales, the heavy clayey soils, and the scanty herbage, are certainly not conducive to the full development of the land mollusca; but on a close search we find a few very interesting and uncommon forms of the smaller species, especially of the genus *Hyalinia*.

On the higher parts of the district occur numerous ponds and ditches, which are almost choked with an abundance of vegetation; from these we take a number of the water-loving species, and from a short length of canal at Bardsley, in the centre of the district, we reap an abundant harvest.

The part of the district worked most thoroughly for land species is a portion of Holden Clough, the whole length of the valley from Oldham Park through Parkbridge, Bardsley, and Riversvale, to Daisy Nook; and for freshwater species, Fitton Hill, Parkbridge, and the canal at Bardsley.

This list is not given as a complete one, for owing to the rough nature of the ground it is a most difficult district to work.

Arion ater (L.)—Very common throughout the district, the only variations noticed being the var. *brunnea*, and a form approaching var. *pallescens*.

A. subfuscus (Drap.)—Occasionally met with on the canal-bank at Bardsley, in the wood below the canal, and at Riversvale a light-coloured form commonly occurs.

A. hortensis (Fér.)—Abundant throughout the district

Limax maximus (L.)—One fine example under a stone in the wood at Bardsley, during the spring of last year; another during June of this year (1897) at Riversvale.

L. flavus (L.)—An example in Coldhurst Street, Oldham, about three years ago, and another in Vineyard Street, Oldham, last June.

Agriolimax agrestis (L.)—Our commonest slug, occurs everywhere; it varies considerably from a milky white, with intermediate shades, to an inky black.

A. lævis (Müll.)—Common in clumps of rushes in wet places near Daisy Nook, and in Riversvale.

Succinea elegans (Risso).—Not uncommon in a ditch at Riversvale on a luxuriant growth of *Ranunculus lingua.*

Hyalinia cellaria Müll.—Common at Bardsley on the canal-bank, and in the wood below; in the year 1891 I took four good examples of the var. *albida* at the bottom of a brick wall in Evelyn Street, Oldham.

H. alliaria (Miller).—Fairly common throughout the district, the beautiful var. *viridula* occurring in great numbers at the roots of grass on a short grassy bank on the towing path of the canal at Bardsley; out of about five hundred specimens taken here, only a single specimen was referable to the type.

H. nitidula (Drap.)—Very common at Bardsley and Riversvale.

H. radiatula (Alder).—Very common on a grassy patch on the towing path of the canal at Bardsley.

H. pura (Alder).—Sparse in moss at Riversvale; the var. *nitidosa* common in the wood below the canal at Bardsley.

H. crystallina (Müll.)—Common throughout the district in woods and on moist banks.

H. fulva (Müll.)—Not uncommon under stones and logs in the woods at Parkbridge and Bardsley.

H. nitida (Müll.)—Rather plentiful on the canal bank at Bardsley. In the summer of 1894 this species was extremely abundant; one evening, after a very hot day, Mr. Hanson and I could have taken hundreds. They were creeping over the bank, enjoying, I suppose, the coolness of the evening; also not uncommon in Holden Clough.

H. excavata (Bean).—By far our commonest *Hyalinia*; the type may be taken in abundance at Bardsley. About four years ago I came across a small colony of the var. *vitrina* on the bleak hillside opposite Parkbridge station. I have also taken a number of this variety, along with the type, in the runs of field-mice in the wood below the canal at Bardsley; I presume they feed on the droppings of the mice.

Helix rotundata (Müll.)—Common throughout the district ; at Bardsley a few of the var. *alba* taken with the type.

H. pygmæa (Drap.)—Common in wet places in Holden Clough, and in the wood at Riversvale.

H. pulchella (Müll.)—This beautiful little shell I have only taken in one locality, at the foot of the wall on the river bridge near Riversvale House ; all specimens taken were of the typical form.

H. aculeata (Müll.)—Sparse in the wood at Riversvale.

H. nemoralis (L.)—Four mature specimens and several young ones in different stages of growth, from a clump of *Epilobium hirsutum* in Riversvale.

H. arbustorum (L.)—Several mature, and numbers of immature specimens in the wet places in Riversvale.

H. hispida (L.)—A few examples in a clump of rushes near Daisy Nook, and common near the aqueduct in Riversvale.

Pupa cylindracea (Da Costa). — Common, adhering to the under-sides of stones under the wall in the wood at Bardsley, and near Daisy Nook.

Vertigo substriata (Jeffr.)—Fairly plentiful in a wet place in Holden Clough, and also in wet places at Riversvale.

Cochlicopa lubrica (Müll.)—Common throughout the district, the var. *lubricoides* occurring with the type at Bardsley.

Carychium minimum (Müll.)—Abundant in moss under stones and at the roots of grass at Parkbridge, Bardsley and Riversvale.

Planorbis fontanus (Lightfoot).—Common in the ditches on Fitton Hill and Parkbridge, and not uncommon in the canal beyond Bardsley Bridge.

P. nautileus (L.)—Common all over the district, in every pond and ditch I have visited, the var. *crista* occurring with the type ; in a ditch on Fitton Hill, a scalariform monstrosity occurs sparingly.

P. albus (L.)—Very abundant throughout the district, most shells being covered with hard black dirt.

P. spirorbis (Müll.)—Occurring in numbers in the ponds near the "Sportsman's Arms," Fitton Hill.

P. vortex (L.)—Abundant in the canal at Bardsley, and in a pond at Riversvale.

P. carinatus (Müll.)—Common and fine in the canal at Bardsley.

P. corneus (L.)—Abundant in the canal at Hollinwood, but only sparse in the same water at Bardsley ; very common in pits at Parkbridge, albino examples being taken commonly with the type ;

also extremely abundant in the reservoir of Messrs. Bradbury & Co. Oldham.

Physa fontinalis (L.)—This delicate species is very common in the canal from end to end.

Limnæa peregra (Müll.)—Abundant in every pond and ditch, the prevailing form in the canal being the var. *ovata*. From among a number of the var. *acuminata* taken from a well on Fitton Hill, I picked a beautiful scalariform shell.

L. auricularia (L.)—Very common in the canal at Bardsley in the early spring, but seems to decrease in numbers at the approach of summer, though a few may be taken throughout the year.

L. stagnalis (L.)—Very abundant in many pits at Parkbridge and Bardsley, and also in the canal there.

L. palustris (Müll.)—A few decollated specimens in a ditch on Fitton Hill; common in ponds and ditches in same neighbourhood, and at Parkbridge a form approaching var. *elongata* occurs.

L. truncatula (Müll.)—In a swamp on Fitton Hill this species is very abundant, and may also be taken sparingly in moist places in the woods.

L. glabra (Müll.)—On the reeds in the ditches on Fitton Hill this species is common.

Ancylus fluviatilis (Müll.)—Very common in the canal at Bardsley.

Velletia lacustris (L.)—This species occurs in numbers on reeds in most ponds and ditches in the district; very fine specimens are taken from an old disused wharf on the canal beyond Bardsley Bridge.

Vivipara vivipara (L.)—Common in the Bardsley canal, but not so common nor so fine as formerly; all the individuals I have taken from this locality have contained young.

Bythinia tentaculata (L.)—The commonest shell in the Bardsley Canal. It varies considerably from a pure white to a dark-red brown.

Valvata piscinalis (Müll.)—A few from the canal at Bardsley. It swarms in a small pool at the bottom of Oldham Park; I was very much surprised to find it there, for the pool is almost full of ashes, old buckets, and other rubbish from the adjoining tip.

Sphærium corneum (L.)—Abundant throughout the district in ponds and ditches; in the canal a light-coloured form occurs, probably var. *flavescens*.

S. rivicola (Leach).—This species seems somewhat migratory with us, some years it may be taken in great numbers in the canal at Bardsley, at other times being very scarce.

S. ovale (Jeffr.)—In the collection of Mr. E. Collier, of Manchester, is a fine set marked "Hollinwood canal," and Mr. R. Standen has taken it in this locality, but never any specimens so large as Mr. Collier's.

S. lacustre (Müll.)—Common in most ponds and ditches in the district, odd specimens of the var. *brochoniana* occurring at Parkbridge. Some years ago I took a few specimens of a form I took to be var. *rotundata* from the Bardsley Canal.

Pisidium amnicum (Müll.)—A few good examples from the Fairbottoms end of the canal, and one specimen from the canal beyond Bardsley Bridge.

P. fontinale (Drap.)—Not uncommon in a pit at Parkbridge; occurs in myriads in the pool in Oldham Park. The beautiful var. *henslowana* may be taken commonly at the Fairbottoms end of the canal.

P. pusillum (Gm.)—Very fine specimens of this species may be taken on Fitton Hill, where it is abundant in every pond and ditch; at Parkbridge and Bardsley the var. *obtusalis* is very common.

P. milium (Held.).—Well distributed at Bardsley, Fitton Hill, and Parkbridge, at the latter place it is clean and fine.

Anodonta cygnea (L.)—Very abundant in the canal at Bardsley, and in pits at Parkbridge.

A. anatina (L.)—One specimen from the Crime Lake, and another from the canal near the pumping station.

Dreissensia polymorpha (Pall.)—Not uncommon in the canal adhering to the walls and old boats, and occasionally to the valves of *Anodonta cygnea*.

MR. J. T. MARSHALL'S CRITICISMS: AN ANSWER.

By G. W. CHASTER.

(Read before the Society, Jan. 12th, 1898).

In this Journal for January, 1897 (vol. 8, p. 348), Mr. Marshall severely criticised my remarks upon his supposed new species, *Scintilla eddystonia*. His comments cannot pass unanswered, and I will deal with them *seriatim*.

My error in substituting *Scacchia* for *Scintilla* was a mere *lapsus calami* for which I ask my readers' indulgence.

Mr. Marshall misquotes my comparison of the shell with *Scacchia elliptica*, a comparison wholly correct in its original form.

Before proceeding further it was necessary for me to establish the identity of my Plymouth specimens with Mr. Marshall's "new shell," for there was a possibility that the shell had been correctly described, and that the artist had so misrepresented it as to give it a wholly different dentition, and one which by chance agreed entirely with that of my shells. I mounted two valves, sent them to Mr. Marshall for examination and received the following answer :—"I can only speak of one of your Plymouth valves, which is similar to *Scintilla eddystonia* in size and every other respect; the smaller valve I have not ventured to touch. The dentition of the Plymouth shell is similar but not identical with that of *Diplodonta*." Now, I have carefully re-examined these shells, and have compared them with a full series of Mediterranean *Diplodonta*, ranging from less than $\frac{1}{20}$ of an inch across to the full size. I have submitted both to a number of competent and well-known conchologists not one of whom finds any difference. The hinge structure is that of *Diplodonta* as given in Woodward's 'Manual.' Quite recently a number of minute *Diplodonta* from Bantry Bay have further confirmed the correctness of my opinion. There is never any trace of a lateral tooth or anything that could be easily mistaken for one. There is a ledge bounding the groove for the insertion of the remarkably placed ligament, but that could scarcely be mistaken for a tooth. I must therefore conclude that I was right in supposing that Mr. Marshall mistook the uncleft cardinal for a lateral.

Mr. Marshall seems also to have misconceived the figure accompanying Jeffreys' description of *Diodonta barleei* which he states "could not be better." There are on the same plate obvious errors of drawing, and in the present instance the figure does not agree with Jeffreys' description and especially with his statement that the shell bears some resemblance in form and size to *Montacuta substriata*. Who would dream of likening this species to the figure with its wholly different form and nearly central umbo? The comparison is quite applicable, however, to the actual shells.

In a foot note to his paper on the Marine Shells of Scilly in this Journal for October, 1897 (vol. 8, p. 433), Mr. Marshall has again erred in the way of careless misquotation. I did not say that the earlier stations of the 1870 'Porcupine' Expedition were *in* the S. and S.W. of Ireland. I should almost as soon have thought of saying that Iceland was *in* the N.W. of Scotland. All these stations however lie between the meridians of Valentia and Galley Head at a distance of some 180—190 miles from land, and I venture to think that my description of their position was far better than Mr. Marshall's vague talk about the entrance to the British Channel.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

267th Meeting, January 12th, 1898.

Mr. R. D. Darbishire in the chair.

Donations to the Library announced and thanks voted:

The Nautilus, vol. 11, no. 8; Journal de Conchyliologie, index to vols. 21–40; Records of the Australian Museum, vol. 3, no. 3; The Annals of Scottish Natural History, no. 25; The Irish Naturalist, vol. 7, no. 1.

Donations to Cabinet announced and thanks voted:

From Mr. A. G. Stubbs: Beautiful specimens of *Helix pulchella H. rotundata*, and *Vitrina pellucida* var. *depressiuscula*, from Tenby; *Helix lapicida*, *Buliminus obscurus*, *Pupa secale*, *Clausilia laminata*, type, and var. *albina* from Cranham Woods, near Gloucester.

New Members Elected.

Mr. Frederick James Partridge, 11, Duchess Road, Edgbaston, Birmingham.

Mr. John Davy Dean, 29, Manley Road, Alexandra Road South, Manchester.

Mr. Arthur S. Poore, 47, Griffin Road, Plumstead, Kent.

Candidates Proposed for Membership.

Messrs. Francis R. Clifton; Walter E. Collinge; E. B. Landis, M.D.

Resignations.

Rev. W. C. Hey; Rev. G. G. E. Storrs; Mr. Walter Garstang; Mrs. Julia Hodgson.

Papers Read.

"Mr. J. T. Marshall's Criticisms: An Answer," by G. W. Chaster.

"Notes on the Land Mollusca of Grange-over-Sands, Lancashire"; and "*Helix nemoralis* monst. *sinistrorsum* in Lancashire," by R. Standen.

Exhibits.

By Mr. R. Standen: *Helix nemoralis* monst. *sinistrorsum* from Lancashire (Mr. R. Wigglesworth's collection).

By Mr. T. Rogers: A new species, *Endodonta waterhousiæ* Hedley, from Lord Howe Island; also *Vitrea lunti* E. Sm.; *Sophina trinitaria* E. Sm.; *Guppya hallucinata* E. Sm.; and *Cæcilioides minutissima* Guppy, from Trinidad.

268th Meeting, February 9th, 1898.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted:

A Catalogue of recent Cephalopoda, Supplement, 1887—96, by W. E. Hoyle; On the Marine Mollusca of Madeira, with descriptions of thirty-five new species and an index-list of all known sea-dwelling species of that island, by Rev. R. Boog Watson; the Eleventh Annual Report of the Liverpool Marine Biology Committee, and their Biological Station at Port Erin, by W. A. Herdman; Life Conditions of the Oyster: Normal and Abnormal, second Report of the Committee, drawn up by Prof. Herdman and Prof. Boyce; Land und Süsswasserkonchylien von Kükenthals Reise, by W. Kobelt; Catalogue of the Hadfield Collection of Shells from the Loyalty Islands, parts 2 and 3, by Melvill and Standen; (*all from their respective authors*). The Nautilus, vol. 11, no. 9; the Journal of Malacology, vol. 11, nos. 3 and 4, Sept. and Dec. 5, 1897 (issued Jan. 22nd, 1898); the Naturalist, no. 493; the Irish Naturalist, vol. 7, no. 2.

Donations to Cabinet announced and thanks voted:

By Mr. A. G. Stubbs: A series of *Saxicava rugosa*, and var. *pholadis* from Giltar, Tenby; and *Thracia papyracea* from Pendine.

By Mr. J. Madison: Some large *Sphærium corneum* var. *scaldiana* from the Worcester Canal reservoirs at Cofton.

By Mr. R. Welch: *Hydrobia ienkinsi* and var. *carinata* from Carrigans-on-the-Foyle, Co. Donegal.

New Members Elected.

Mr. Francis R. Clifton, 24, Park Street, Stoke Newington.

Mr. Walter Edward Collinge, F.Z S., Mason University College, Birmingham.

Mr. E. B. Landis, M.D., English Church Mission, Chemulpo, Corea.

Resignation.

Mr. Harold Barke.

The late Archdeacon Anson.

The Chairman said he was certain all the members present would sympathize with his feelings of regret at the death of Archdeacon Anson, who, though not a member of the Society, had taken great interest in the study of conchology and had been instrumental in obtaining the Lifu Mollusca collected by the Rev. James and Mrs. Hadfield.

Letter Read.

The following letter to the President was read :—

"INTERNATIONAL CONGRESS OF ZOOLOGY, 1898.
"3, HANOVER SQUARE, LONDON, W.
"*January 10th, 1898.*

"To the President of the Conchological Society.

"SIR,

"We beg to call your attention to the forthcoming meeting of the International Congress of Zoology, which will commence its meeting in Cambridge on August 23rd, 1898, under the presidency of the Rt. Hon. Sir John Lubbock, Bart., M.P., F.R.S.

"It is expected that the Congress, which is international in character as well as in name, will be attended by eminent zoologists, representing every branch of zoological science, from the Continent, from America, and from the Colonies.

"A detailed programme of the proceedings will be forwarded to you at a later date. Meanwhile we venture to express our hope that your Society will be able to assist in defraying the expenses of the Congress by making a donation from its funds. We shall further be much obliged to you if you will take the earliest opportunity of announcing the date and place of meeting to the members of your Society, and will extend to them the cordial invitation of the Executive Committee to be present.

"We remain, Sir,
"Your faithful servants,
"F. JEFFREY BELL
"G. C. BOURNE } *Secretaries.*"
"ADAM SEDGWICK

Papers Read.

"The Mollusca of the Falkland Islands," by J. Cosmo Melvill and R. Standen.

"Note on *Terebra eximia* Dh.," by R. Standen.

Exhibits.

By the Manchester Museum: The collection of marine shells from Lively Island, Falklands, dealt with in Messrs. Melvill and Standen's paper.

By Mr. R. Standen: Specimens of *Terebra eximia* Dh., from Madras (Manch. Mus. Coll.) and Borneo, to illustrate his note.

By Mr. J. Madison: *Sphærium corneum* var. *scaldiana* from Worcester Canal Reservoirs, Cofton.

By Mr. A. G. Stubbs: *Saxicava rugosa*, and var. *pholadis* from Giltar, Tenby; and *Thracia papyracea* from Pendine; also a remarkable series of *Planorbis spirorbis*, in four boxes—(*a*) extremely large and perfect normal types; (*b*) a series of over 20 specimens showing angular compression and a general tendency towards distortion; (*c*) twenty-eight examples showing extraordinary contortion, chiefly in the last whorl, which is in many cases separated from the rest (subscalariform), and in several is curled round either base or apex of shell in a sort of knot; some specimens have begun in a subscalariform manner, and finished quite normally, these present the appearance of a small table; (*d*) twenty-four specimens, truly scalariform, varying from a simple coil, more or less regular, to a perfect "corkscrew" form. All these specimens, which undoubtedly present the most remarkable assemblage of distorted shells ever shown at a meeting of the Society, were taken in Black Rock Stream, Tenby, in 1897-8.

By Mr. L. E. Adams: An album formerly belonging to the late Mr. A. Adams, and containing a large number of autographs of eminent British and Foreign Conchologists.

By Mr. W. Moss: A number of *Hyalinia* from Anglesea and elsewhere, upon which he made some remarks which gave rise to an animated discussion. Mr. Moss further expressed the hope that any members who might have an opportunity of procuring living *Hyalinia glaber* or *Hy. draparnaudi* during the season, would send him specimens either alive or in spirit for dissection.

269th Meeting, March 9th, 1898.

Mr. J. R. B. Masefield, President, in the chair.

Donations to the Library announced and thanks voted:

Zoological Bibliography and Publication, Report of the British Association Committee; Transactions of the Royal Society of South Australia, vol. 20, part 2, Dec. 1897; The Nautilus, vol. 1, no. 10; Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 42, part 1; The Naturalist, no. 494; The Irish Naturalist, vol. 7, no. 3; La Feuille des Jeunes Naturalistes, ser. 3, vol. 28, nos. 328 and 329; Annales de la Société Royale Malacologique de Belgique, vols. 28-31, 1893-96; Note on some rare Cephalopods, and two Cephalopods from Teneriffe, by Einar Lönnberg; Mollusques terrestres et d'eau douce de Kaméroun, by Adolf d'Ailly; Sitzungs-Berichte der Gesellschaft Naturforschender Freunde zu Berlin, 1896.

Donations to Cabinet announced and thanks voted:

Specimens of the monstrosities of *Planorbis spirorbis* from Tenby.

Candidates Proposed for Membership.

Mr. Henry Woods, M.A., F.G.S.; Mr. John Wishart, B.Sc.

Proposed Excursion.

The President announced that he was organising a Conchological Excursion on May 21st to the neighbourhood of the Churnet Valley, to which all members would be cordially invited. For particulars see page iii. of cover.

Papers Read:

"On *Latirus armatus* Ad.," by J. Cosmo Melvill.

"Observations on abnormality in *Planorbis spirorbis*, and other freshwater shells at Tenby," by A. G. Stubbs.

"Note on *Scalaria fimbriolata* Melv.," by J. Cosmo Melvill.

Exhibits:

By Mr. J. Cosmo Melvill: Two specimens of *Scalaria fimbriolata* from the Persian Gulf, to illustrate his note; also a very unusual monstrosity of *Mitra episcopalis* L., in which the whorls just below the sutures are extremely thickened, their incrassation being perfectly regular, and giving the appearance of a projecting band of ivory whiteness, free from the usual orange markings of the body whorls. The shell thus looks scalariform. A very richly coloured and perfect normal form was also shown for comparison.

By Mr. A. G. Stubbs: A series of *Physa hypnorum*, *P. fontinalis*, *Limnæa peregra*, *L. palustris*, *Planorbis nautileus*, and *P. spirorbis*, to illustrate his paper.

By Miss G. M. Harrison: A small series of marine shells from the Cape of Good Hope, collected by herself, including fine examples of *Turbo cidaris*, *Liotia granulosa*, *Oxystele zonatus*, *Gibbula cicer*, and *G. multicolor*.

By Mr. R. Standen: A small set of interesting marine shells, presented to the Manchester Museum by Miss E. C. Wilson, who had herself collected them at Grand Canary, amongst them being the specimen of *Latirus armatus*, dealt with in Mr. Melvill's paper, *Ranella scrobiculator*, *Patella aspera*, *Pecten corallinoides*, *Gibbula candei*, *Trochus sauciata*, *T. tamsi*, and *Cardita fabula*.

By Mr. H. Bolton: The series of *Anthracosia turgida* and *Tellinomya robusta*, from the Lancashire Coal Measures, contained in the Manchester Museum.

Amalia gagates (Drap.) **in Northamptonshire.**—Last June (1896) I came upon a colony of the above species in a town garden in Northampton. The slug has not yet been met with in the surrounding district, and it is possible that it has been introduced at some time in plant mould. I may mention that this species, though often found far afield, thrives particularly well in gardens.—LIONEL E. ADAMS, Northampton (*Read before the Society*, August 12th, 1896).

Helix nemoralis monst. **sinistrorsum in Lancashire.**—On June 15th, 1897, Mr. R. Wigglesworth, of Clayton-le-Moors, took a fine living specimen of this rare monstrosity in a lane leading to Low Moor, Clitheroe, and has since very kindly presented the shell to me. It is a well-grown example, in the best possible condition, of typical *libellula* with the three lower bands coalesced. Careful search was made for others but without success, although normal examples were plentiful enough. It is interesting to note that this is but the second instance on record of the occurrence of reversed *H. nemoralis* in the County Palatine—the first being recorded by me in this Journal, vol. 6, p. 175.—R. STANDEN (*Read before the Society*, January 12th, 1898).

New forms of Helix terrestris Penn.—During the mild weather of February last (1897) I visited the colony of *H. terrestris* and found them feeding in numbers on the blades of grass. Amongst them were several individuals with interrupted bands, which presented a tesselated appearance, and one with the band widened so as to cover the whole shell with the exception of the projecting ridges. These two forms correspond to *V. maculata* of *H. virgata* and *V. fulva* of *H. caperata*, therefore I suggest these names for the similar forms of *H. terrestris*. I took several *B. obscurus* with the above covered with chalk, which gave them the appearance of being banded with white.—C. E. WRIGHT, Kettering, March 20th, 1897 (*Read before the Society*, July 14th, 1897).

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Catalogue of the Fossil Cephalopoda in the Department of Geology, British Museum (Natural History). Part 3. Bactritidæ, and part of Ammonoidea; by A. H. FOORD and G. C. CRICK. London, 1897.

The present catalogue is a welcome contribution to our knowledge of a group of Mollusca which attained a considerable development in palæozoic times. The study of the Goniatites which are here chiefly dealt with, is so beset with difficulties that thorough workers have been few, and most collections of any repute will be found to include specimens which have not been identified by their owners. Neither the word *Goniatites*, as a genus, nor Goniatitidæ, as a family, occur in the catalogue, being replaced by the much later and less familiar *Glyphioceras* and *Glyphioceratidæ*. Apart from these changes, the catalogue will prove a most useful help to students of the palæozoic mollusca, by reason of the fact that practically all known British species of the various genera are described. Further, the suture line is figured, which will certainly lead to a speedy addition of new species and a better knowledge of the ranges of all.

The main features of the catalogue we take to be these:—(1), A uniform plan of description throughout, which is explained on p. 18; (2), Careful definition of terms; (3), Peripheral and side views of many species with a drawing of the suture line in many cases; (4), A careful bibliography; (5), Descriptions of new species. The figures are incorporated in the text in immediate relation to the description, and are from carefully executed blocks.

The bibliography in many cases is a study in itself, thirty-seven references, for instance, being given to *Glyphioceras* (*Goniatites*) *sphericus*. The work is a monument of thought and care, and Messrs. Foord and Crick are to be congratulated upon the completion of a well-executed and difficult task.

"Catalogue of Tertiary Mollusca" in the Department of Geology, British Museum (Natural History) Part I.: The Australian tertiary mollusca; by G. F. HARRIS. London, 1897.

This volume is the first of a new series of catalogues which are intended to describe the fossil Mollusca of different parts of the world. Dr. Woodward has been fortunate in having induced Mr. Harris to undertake the preparation of this volume, for it is no mere catalogue in the ordinary sense—a mere list of names and synonyms. The method of its preparation is thoroughly comparative and special pains have been taken to ascertain, wherever it was possible, what characteristics were to be regarded as stages in the development of the individual and what as stages in the phylogeny of the group. It is also shown that many differences which have been relied upon for the separation of genera and species are either indicative of stages of growth or are merely individual variations. In *Conus cuspidatus* the elevation of the spire belongs to the latter category. The author as the result of these enquiries arrives at the rule that when the scheme of ornament appears early in the course of individual development it is a criterion for the discrimination of species, but when it does not appear till later life it merely characterises the individual. This is, in short, a book which should be studied by every philosophical conchologist.

The Nautilus, vol. 11, nos. 8–10, Dec.–Feb., 1897–98.

"New West American shells," by W. H. DALL [*Sigaretus oldroydi*, *Pecten* 3 n.spp.]. "Note on two species of *Helicina*," by C. F. ANCEY [*H. rabei* Pilsb. = *H. rufocallosa* Anc.]. "*Oxychona* unmasked," by H. A. PILSBRY [*Oxychona* = *Drymæus*]. "A new plicate *Unio*," by B. H. WRIGHT [*U. walkeri* n.sp.]. "*Polygyra ferrissi* n.sp.," by H. A. PILSBRY [Tenn. and N.C.]. "A classified

catalogue of American land shells, with localities" (*cont.*), by H. A. PILSBRY.

Jan., 1898: "Some new eocene fossils from Alabama," by T. H. ALDRICH [4 n.sp.] "A proposed census of Michigan mollusca," by B. WALKER. "On a new species of *Vitrea* from Maryland," by WM. H. DALL [*V. raderi*]. "A new undulate *Unio* from Alabama," by B. H. WRIGHT [*U. triumphans*]. "*Modiola plicatula* Lmck., an extinct locality," by R. E. C. S. [Copley Square, Boston]. "A classified catalogue of American land shells, with localities" (*cont.*), by H. A. PILSBRY.

Feb., 1898: "*Unio* (*Lampsilis*) *amphichænus* n.sp.," by L. S. FRIERSON [Sabine River, La., figd.]. "Notes on Quebec Pupidæ and other shells," by A. W. HANHAM. "Description of a new *Unio*," by B. H. WRIGHT [*U. reclusus*, Ocklocknee River, Fla.]. "New *Pisidia*," by Dr. V. STERKI [*P. singleyi*, Tex., Mexico; *P. splendidulum* Me., Va., Mich.] "A classified catalogue of American land shells, with localities" (*cont.*), by H. A. PILSBRY.

The Journal of Malacology, vol. 6, nos. 3 and 4, Sept. and Dec, 1897 (issued Jan. 22, 1898).

"On some new species of land shells from the Island of Socotra," by E. A. SMITH [10 n.spp. *Ennea*, *Buliminus*, *Stenogyra*, *Auricula*, *Lithidion*, pl. 5]. "Species of *Plectopylis*, recently described in 'Science Gossip,'" by G. K. GUDE. "The British species of *Testacella* (*cont.*)—Distribution and reproductive system," by W. M. WEBB [pl. 6]. "The distribution of British non-marine mollusca—(1), Hand list for Essex."

Proceedings of the Academy of Natural Sciences of Philadelphia, 1897, part 2, April–September.

"New species of mollusks from Uruguay," by H. A. PILSBRY [14 n.spp. mostly figured on pl. 6 and 7]. "External features of young *Cryptochiton*," by H. HEATH. "*Cyprea lynx* deformed by disease," by J. FORD [with cuts]. "Patagonian tertiary fossils," by H. A. PILSBRY [*Trophon inornatus* n.sp. figured, *Turritella innotabilis* n.sp.].

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ADDITIONS TO "BRITISH CONCHOLOGY."

(Continued from vol. 8, p. 395).

By J. T. MARSHALL.

(Read before the Society, July 14, 1897).

SCAPHOPODA.

Dentalium entalis var. **anulata** Jeffr.—In deep water off the coasts of Yorkshire, Durham, and Aberdeen; Sound of Sleat, 60—90 f.; the Minch, 45—70 f.

Var. **infundibulum** Jeffr.—Generally distributed in suitable localities.

The "ring-like marks of growth" which Jeffreys attributes to the var. *anulata* are individual, and common to all specimens; *gracilis* would have been a more suitable name. Examples from some of the above records are much more slender than the Shetland form. It lives in fine sand in deep water, while the var. *infundibulum* occurs on rough ground; the latter is really a stunted form, caused by the action of a rough bottom wearing away and successively breaking off the point. Numbers of the ends of *D. entalis* are sometimes brought up by the dredge, having been cut off by the scraper. This would indicate that the apex of the shell protrudes above the surface of the sea-bed.

D. vulgare Da Costa.—Bantry Bay specimens are coffee-coloured. Monstrosities are rare, but an example from Guernsey is abnormally curved.

D. striolatum Stps.—Færœ Channel, 570 f. ('Triton'). *D. agile* G. O. Sars also occurred at the same locality and depth (!)

Cadulus jeffreysi Mtros.—Færœ Channel ('Triton'). Var. *tumidula* G. O. Sars also occurred in the same cruise (!)

Siphodentalium lofotense G. O. Sars.—Generally distributed throughout the Hebrides on suitable ground—muddy sand in 10—95 f., with *Axinus croulinensis*. Without going through the tedious and laborious process of mud-sifting, no one can hope to obtain this species in any number. I will enumerate the localities that I have collated—Off Cumbrae (Robertson)! Strachur, Loch Fyne, 22—56 f., and Shuna Island, 27 f. (Knight)! Rum Island, 33 f.; Sound of Sleat, 20—95; Loch Hourn, 20 f. and 75 f.; Gairloch, 12 f. and 30 f.; Minch off Barra, 50 f.; and Loch Boisdale, 10—30 f. (Somerville and J.T.M.); off Skate Island, 107 f. (Scott)! Rathlin Island, (Chaster); off the western side of Lundy Island, 36 f.; Tarbert, 75 f.; Oban, 18—25 f.; Loch Inver, 20—25 f.; West Orkneys, 45 f. It varies in the degree of curvature and in slenderness.

S. vitreum Sars has been dredged off the Færœs by the 'Lightning,' and *S. quinquangulare* Forbes in the Færœ Channel by the 'Triton.'

S. affine Sars.[1]—Sound of Sleat, 75—95 f. (Somerville and J.T.M.): Loch Fyne, 56 f.: Minch off Loch Boisdale, 72 f. Half the specimens were living. Dr. Robertson is said to have taken it from "material dredged off Skate Island, at the mouth of Loch Fyne, in 90 to 100 f."[2]

Distribution: Channel Slopes; Atlantic off Ireland and off Portugal, 690 f. to 1,380 f. ('Porcupine'); Lofoden Isles, 100—300 f. (Sars); Nova Scotia, 35 f. (Verrill); North Atlantic, 1,450 f. ('Valorous').

This lives with *S. lofotense*, and differs from that species in being shorter, broader, less cylindrical, and without the conspicuous rings of growth. It is in no part cylindrical, but gradually increases from apex to base, and the apex, though similar, is blunter or broader. L., 0·15; B, 0·03 inch. With regard to the proportions of length and breadth, the extreme forms of the two species meet, slender examples of *S. affine* approximating to broad specimens of *S. lofotense*.

GASTROPODA.

Chitonidæ.—There seem to be insuperable difficulties in arranging the Chitonidæ on a satisfactory basis. There are, it is true, various "systems" awaiting acceptance, all differing more or less from each other, the difficulty being to reconcile what is apparently irreconcilable. No group of mollusca has given rise to greater controversy, and, it should be added, to greater research of a laborious and baffling nature by some of the best naturalists. But Mr. W. H. Dall, whose opinions on the classification of the Chitonidæ are entitled to great weight, writes that "the absence of any well-marked types by which this order might be divided into families, or even sub-families, is very remarkable, and in this respect the variations of the dentition agree with the other characters of shell-plates, girdle, and internal structure. This has already been remarked as regards the girdle and shell by Dr. Carpenter, who recognised that even his chief divisions of the order into Regular and Irregular Chitons failed to possess distinct family value."[3]

Among some further notes in the same interesting work, Mr. Dall states that "Chitons in the adult condition are destitute of eyes or tentacles, and exhibit evidences of degradation anteriorly. They differ from most molluscs in that the shell does not appear on the

1 *Forh. Selsk. Christiania*, 1864, p. 299, pl. vi., f. 34-35.
2 *Trans. N. H. Soc. Glasgow*, n.s., vol. 2, p. 152.
3 Exploration of Alaska, art. 4, p. 74 (*Bull. U.S. Nat. Mus.*, vol. 1).

embryo until some time after they are hatched."[1] But if the head of *Chiton* is without eyes, it is amply compensated by the immense number contained in its shell, first described by the late Professor Moseley.[2]

Chiton fascicularis var. **attenuata** Jeffr.—Ilfracombe.

I have taken the fry and young of the type from sea-weeds during the month of September; the former are long and very narrow, without any appearance of side tufts—these begin to appear when the animal is about a line in length.

C. debilis Gray.—Loch Boisdale, 20—50 f., plates; Sound of Sleat, 30—80 f., plates (Somerville and J.T.M.); Guernsey, off St. Martin's Point, 20 f., a fine living specimen (Burkill)! Scilly, 40 f., a perfect specimen and some plates (Burkill and J.T.M.); Lynn of Morven, 40 f., plates (Knight)! Clyde, 18 f.; Loch Inver, 25 f.

C. scabridus Jeffr.—St. Clement's and St. Aubin's Bays, Jersey (Duprey and J.T.M.); the north-eastern parts of Guernsey and the south-western parts of Herm; probably in other parts of the Channel Islands in suitable localities. Also in Torbay, but rare. Professor Gwatkin tells me that the radula differs markedly from that of any other British *Chiton*. It is figured in Sowerby's Index.

C. cancellata G. B. Sow.—Low water to 40 f. Scilly (Burkill and J.T.M.); Lismore, 6 f. (Knight)! Falmouth Bay; Milford Haven; Vatersay Sound, Barra, 5 f. The finest come from Guernsey and are $\frac{3}{8}$ inch in length. The shells are sometimes pure white.

C. cinereus var. **rissoi** Jeffr.—Clyde (A. Brown); Sutherlandshire (Baillie)! Scilly (Burkill and J.T.M.); Herm, between tide-marks; Guernsey, 20 f.; Aberdeenshire. Not Payraudeau's species of that name, and not Mediterranean.

The ringing of the changes on *C. cinereus* L. and *C. marginatus* Penn. would suggest a misplacement of tickets or specimens in mounting or remounting the Linnean collection, for as a plain matter of fact *C. marginatus* is not cinereous, and could not be called so with any consistency; while on the other hand the term *cinereus* cannot properly apply to any other *Chiton* than the cinereous one.

C. ruber Lowe.—This species has been much confused by some European writers, who have persisted in referring it to *C. marmoreus* Fab., though Mr. Sylvanus Hanley, who says he has traced and examined the Linnean Chitons, has left this theory no foundation. I have specimens an inch in length from the coast of Alaska, where it is one of the most abundant species.

1 *Op. cit.*, p. 67.
2 *Quart. Journ. Micr. Sci.*, vol. 25, p. 37-60, pl. 4-6, 1885.

C. lævis Mtros.—Scilly Isles (Burkill and J.T.M.).

Var. **navicula** Jeffr.—Sutherlandshire (Baillie)!

C. marmoreus Fab.—Mr. Pearcey has taken specimens in the Firth of Clyde 2½ inches in length.

C. ruber, *C. lævis*, and *C. marmoreus* are somewhat confusing in colour and appearance, especially when not well preserved; in the latter case, the girdle may be found to afford the most distinguishing character. That of *C. ruber* is finely granulated, and has a mealy appearance; that of *C. lævis* is much broader, and under a lens resembles hair-cloth; while that of *C. marmoreus* is equally broad as the last, but smooth except under a high power.

Patella Lister.—A very able paper on the limpet tribe has been given by Mr. Dall,[1] and a highly interesting paper on the habits of the limpet by Mr. Clark Hawkshaw.[2]

Dr. Lawrence Hamilton,[3] in experiments on the adhesive power of the limpet, came to the conclusion "that while some portion of the adhesive power may or may not be due to atmospheric pressure, a very considerable amount, if not the major part, or perhaps all, is probably dependent upon the throwing out of a very tenacious substance."

As regards the "homing" of the limpet, I am of opinion that the return of the animal to its starting-place is due to its scar having all the inequalities correspondant to the irregularly serrated edge of its shell, as these inequalities would add considerably to its mechanical hold; whereas it would be inconvenient, and not quite safe from enemies, if it had to adhere to any surface haphazard each time it travelled.

Dr. Jeffreys has related how the lighthouse-keeper at Scalpa, in the Hebrides, had noticed rats on the rocks feeding on the limpets, which they detached "by a sudden jerk with their noses; should the first effort fail, another is never attempted against the same individual, now warned and adhering closely to the rock; but the rat instantly proceeds to others off their guard, until enough food is procured." I have noticed the same thing in some parts of Torbay, where rats abound in the cavernous cliffs, and in quietly lunching after a morning's work at low tide, I have often seen them at their work. My attention was first attracted by one day seeing my little black-and-tan terrier excitedly chasing something among the boulders at the water's edge, until he succeeded in intercepting and keeping at bay an unusually large and fierce rat, which he managed to dispose of after several "rounds." Mr. Collings, the Seigneur of Sark, has several

1 Exploration of Alaska, p. 118 *et seqq.*

2 *Journ. Linn. Soc.* (Zool.), vol. 14, p. 406-411, 1878.

3 *Natural Science*, Oct., 1892.

preserved rats which have been found drowned by limpets, their tongues having been firmly pressed to the rocks. There may be a connection between this practice of limpet-eating by colonies of rodents, and the various "Rat Islands" that are scattered round our coasts.

P. vulgata L.—The fry are very curious, and may be found in dwarf sea-weeds during March and April. This extremely common species was very rare during the Crag period, only two small specimens, three-eighths of an inch in diameter, being recorded by Searles Wood.

Var. **elevata** Jeffr.—Jersey and Guernsey. This must not be confused with high-spired examples, which are to be found of all the varieties and of all sizes.

Var. **picta** Jeffr.—Exposed rocks in the Channel Islands; Torquay; Tenby; Butt of Lewis. I regard this as a stunted form of the var. *intermedia*.

Var. **intermedia** Knapp.—Usually rounder than the type. Tenby.

Var. **depressa** Penn.—In a few cases this is beautifully rayed inside.

A monstrous specimen of the last variety from Guernsey has the whole of the crown filled in with a pearly deposit, and it is difficult to realise how the animal accommodated itself inside the shell. Another monstrous form of the type from Torbay is circular and almost flat, like a penny-piece; it was empty, but its tenant could not have resembled the normal type. A uniform pale yellow variety inhabits caves at Sark.

Helcion pellucidum L.—Specimens as large as Jeffreys' figures and dimensions are not often met with. The fry swarm in sea-weeds in March, April, and May; they have a spiral apex, similar to that of *Patella*. A form from Eigg Island, in the Hebrides, is whitish, semi-transparent, and exceedingly thin.

Var. **elongata** Jeffr.—Killala Bay (Miss Warren)! Sutherlandshire (Baillie)! Bordeaux Harbour, Guernsey; Borough Island and Torbay, S. Devon. The young of this are remarkably elongated.

Tectura Aud. M.E.—It is not easy to decide between the conflicting claims of *Tectura* and *Acmæa* for precedence. Technically, it should be *Acmea* Eschscholtz, but morally it should be *Tectura* Aud. M.E. Mr. W. H. Dall[1] on the one hand, and Dr. R. Boog Watson[2] on the other, have exhaustively stated and re-stated all the

1 *Amer. J. Conch.*, 1871, p. 37.
2 'Challenger' Gasteropoda, p. 28–9.

points in connection with the subject, and though both of them decide for *Acmæa*, it is one of those cases in which everyone is largely at liberty to please himself, and I make no apology for retaining the name so long used by British conchologists.

T. testudinalis Müll.—Isle of Man (Archer); Llandudno (Tomlin); Fleetwood (Heathcote); Doggerbank and Scarborough. This species would appear to be still migrating southward. It is occasionally of a uniform dark brown. I have specimens from the North Pacific $2\frac{1}{8}$ inch by $1\frac{3}{4}$ inch.

Var. **pallida** Verkrz.—Girdleness, near Aberdeen (Simpson)!

T. virginea var. **conica** Jeffr.—Higher and rounder; position of apex as variable as in the type. This variety is usually dredged, bu conical specimens of the type are occasionally found between tide-marks.

Var. **lactea** Jeffr.—Kincardineshire (Simpson)! Gorran, Cornwall (Couch); Herm Island.

Jeffreys writes[1] "that the position of the apex is very variable, and that an adult specimen dredged by Admiral Acton in the Bay of Naples, in 60 f., has a spiral and persistent apex or nucleus"; but the nucleus is usually shed at a very early age, and the apex in young specimens shows a slight depression caused by the shedding of the embryonic spire.

There is some doubt as to the correctness of the Mediterranean record. The Marquis di Monterosato contends that the Mediterranean shell is not Müller's species, while Jeffreys maintains that *Lottia unicolor* Forb., which is Mediterranean, is only a synonym of *T. virginea*, and is not *Gadinia gussoni* O. G. Costa.

Lepeta fulva Müll.—See *J. Conch*, vol. 8, p. 30, Jan., 1895.

Var. **expansa** Jeffr.—Gairloch, 30 f.; Loch Inver, 25 f.; Loch Boisdale, 35 f. (Somerville and J. T. M.). Equally variable as *Tectura virginea* in shape and height.

L. cæca Müll.—Loch Fyne, a dead specimen (Coll. MacAndrew); Kyles of Bute, 18 f.; another dead specimen. Mr. Frank Coulson, of Glasgow, has a specimen dredged alive in the Hebrides or East Shetlands, he is not sure which, but he has never dredged outside British waters.

Propilidium ancyloïdes Forb.—Shuna Island and Lynn of Morven, in Loch Linnhe, 27—50 f. (Knight)! Sound of Sleat, 30—90 f., and Loch Boisdale, 35 f. (Somerville and J. T. M.); Clyde, 18 f.; Lamlash, 20 f.; Oban, 25 f. Also in the British Channel, 690 f. (Porcupine)!

1 *Proc. Zool. Soc.*, Nov. 1882, p. 671.

Jeffreys' remark "not uncommon" would imply a common shell, but this is not so, it is everywhere scarce. The Loch Boisdale specimens belong to a depressed variety.

Puncturella noachina L.—14—90 fathoms. Liverpool Bay (Tomlin); Loch Boisdale 30 f.; and Barra 30—53 f. (Somerville and J. T. M.); Oban, 14—25 f.; Lamlash, 15 f.; Doggerbank, 30 f. Varies greatly in the height of the spire. A form almost as numerous as the type has the spire less elevated and the base more expanded. Jeffreys' figure represents the one, and Sowerby's the other. Another form from the Clyde is compressed at the sides like var. *princeps*, but has a depressed spire.

Emarginula fissura var. **subdepressa** Jeffr.—Sutherlandshire (Baillie)! Scilly (Burkill and J. T. M.); Herm, low water; Guernsey, 18 f.; Loch Fyne, 25 f.; Loch Boisdale and other parts of the Hebrides.

Var. **elata** Jeffr.—Sutherlandshire (Baillie)! Herm, low water; Guernsey, 18 f.; Clyde, 18 f.; Glenelg, 30 f.; Loch Boisdale and other parts of the Hebrides.

Var. **incurva** Jeffr.—Lamlash, 18 f.; Clyde, 18 f.; Loch Boisdale and other parts of the Hebrides.

Two monstrous specimens from Guernsey have a second growth proceeding out of the original one, and look like two shells fitted one in the other. Jeffreys' figure represents the type, and Sowerby's the var. *elata*.

E. rosea Bell.—Twenty-five per cent. of Guernsey specimens are more conical than the type, the spire is less raised and does not overhang the margin, and the sides are more expanded; they form a passage to *E. fissura* through the var. *incurva*. No attention has hitherto been given to the variation of the Channel Islands' mollusca from the types of the British coast proper. It is full of curious interest.

E. crassa J. Sow.—The MacAndrew Collection contains two small specimens said to have been found by Miss Roberts at Anglesea, but the locality is doubtful. Specimens obtained underneath stones at low water are usually badly stained and encrusted, but dredged examples are snowy white, and show the microscopic sculpture well.

Fissurella græca var. **gibba** Jeffr.—Loch Creran near Oban (A. Brown).

Calyptræa chinensis L.—The Crag form of this species far surpasses the recent one in point of size; it is $1\frac{1}{2}$ inch in diameter, and was for that reason at first described as a distinct species.

Var. **spirata** Nardo.[1]—Off Portland Breakwater 11 f. This must not be mistaken for a small conical form sometimes found attached to pebbles named and figured by S. Wood var. *conica*; the latter has not the peculiar spiral twist which belongs to the var. *spirata*.

Crepidula unguiformis Lm.—This American and Mediterranean species is occasionally met with dead on our shores, having presumably been imported with oysters from America, and in one instance living specimens have been taken in the Crouch River, Essex. Several other American mollusca are in the same category.

Haliotis tuberculata L.—Dr. Jeffreys' statement that this species "adheres to rocks like the limpet" is rather misleading. They adhere to the under sides of large stones, never on the surface of rocks like the limpet. My smallest specimen is a line in length, and the animal had just finished, and had also closed up, its first eyelet-hole.

Scissurella crispata Flem.—Eigg Island, 20 f.; Loch Boisdale, 20—50 f.; Minch off Barra, 40 f. (Somerville and J. T. M.); Clyde, 18 f.; Sutherlandshire; West Orkneys, 45 f. Also Corea, 30—50 f.; ('Sylvia') !

Cyclostrema cutlerianum Clark.—10 to 40 fathoms. Scilly (Burkill and J. T. M.); Isle of Man (L. M. B. C.) ! Herm; Land's End; Borough Island; Torbay; Weymouth and Lulworth. The sculpture is easily discernible with an ordinary lens.

C. nitens Phil.—Scilly (Burkill and J. T. M.); Aberdeenshire; Sutherlandshire; Castle Bay, Barra; West Orkneys, 45 f.

Resembles the fry of *Trochus helicinus*, but may be recognised by the aperture, which forms a complete peristome. Sowerby's fig. 23, pl. xi.,[2] is not *C. nitens*, as indexed, for the peristome is incomplete, and the pillar lip is reflected, neither of which characters pertain to *C. nitens*. It may probably have been meant for the male form of *Trochus helicinus*, as it would just suit it, and is placed next to the female form of that species. His fig. 22, pl. xiv., indexed as *C. nitens* var. *alderi*, is the type form. Jeffreys' figures are useless for reference; they are globose instead of depressed, and striated instead of smooth. Forbes and Hanley's (as *Margarita pusilla*) are better.

Mölleria levigata Jeffr.—"I had overlooked a specimen of this little shell among my Shetland dredgings. The peristome and the curved striæ at the base show that it belongs to *Mölleria* and not to *Cyclostrema*." [3] It was also dredged by the 'Lightning' between the

1 *J. Conch.*, vol. 7, p. 249, 1893.
2 Illustrated Index of British Shells.
3 *Proc. Zool. Soc.*, March, 1883, p. 89—91.

Shetlands and Færœs, but nearest the latter group, in 62 f. and 510 f. It is a Norwegian species, and was originally described by Herr Friele from Bergen. The synonyms are *Cyclostrema lævigatum* G. O. Sars, and *C. basistriatum* and *C. curvistriatum* Brugnone.

Specimens of *M. costulata* Möll., have been dredged by Mr. Alfred Brown off Silvercraigs, Loch Fyne, 12 f.; and by myself at Lamlash 10 f.; and Clyde 18 f.; dead specimens and probably fossil. It is well figured in Sowerby's Index.

Circulus striatus Phil.—Bartra Island, co. Mayo; and Portrush, co. Antrim.

Trochus helicinus Fab.—Groomsport, co. Down; Portrush, co. Antrim.

Var. **fasciata** Jeffr.—Portrush; East Sutherlandshire.

T. grœnlandicus Chemn.—All the figures of this shell exhibit four whorls, while different writers describe them as having four, five, and six whorls. In reality, an adult specimen has six, the first two of which are smooth and white, and the size is a quarter of an inch. Jeffreys' figure is a bad one both in shape and execution, and different from Sowerby's very good one. Forbes and Hanley give four capital figures (as *T. undulatus* and var.), only one of which is adult and has five whorls, the others being obviously immature or dwarfs, as the annexed measurements indicate one-eighth of an inch, while the authors describe it as one-fifth.

Var. **dilatata** Jeffr.—Sutherlandshire (Baillie)! but sculptured as the type.

Var. **lævior** Jeffr.—Skye, 30 f. This variety is usually smaller than the type, but my Skye specimens are larger, and deep pink in colour.

T. cinctus Phil.—Extremely variable in sculpture. Not uncommon in some parts of the Atlantic. Jeffreys described a var. *affinis* from the 'Porcupine' expedition.

T. magus L.—Very variable as regards height of spire and convexity of whorls. Specimens from between tide-marks differ from those which are dredged in being more depressed, and the whorls are not so turreted nor so nodulous below the suture. Bucquoy, Dautzenberg, & Dollfus have named this form var. *obsoleta*, and a similar form with a raised spire, which I have from Guernsey and Fowey, is their var. *producta*.

Var. **alba** Jeff.—Cobo Bay, Guernsey (Cooke and Gwatkin); Herm, low water. A colourless form is not uncommon.

Var. **conica** Marsh. (*J. Conch.*, vol. 7, p. 250, 1893).—Heacham, Norfolk (Mayfield)! (This is the only record I know from the east

coast for *T. magus*). Herm Island, at very low water. This is a simple cone with compressed whorls, and has the outlines of *T. zizyphinus* var. *humilior*.

T. cinerarius L.—The range in the height of the spire is extreme. Both this and *T. umbilicatus* have corresponding elevated and depressed forms, and in some rare cases the markings of *T. umbilicatus* approximate to this species.

Var. **electissima** Thorpe.—Some dwarfs of this from Guernsey are only two lines in height and breadth.

Var. **variegata** Jeffr.—The characters of this variety are occasionally combined with the last.

T. umbilicatus var. **agathensis** Récl.—Jeffreys has described the animal in the 'Lightning' Report. According to Monterosato, *T. agathensis* Récl. is a good species, from Provence and Cette, but *not* Atlantic. He cites it as "*Gibbula agathensis*, Récl., ex typo in coll. Hanley." Dr. Norman goes a step further and re-names our shell var. *sarniensis*; but if the name has to be altered for any reason, Lowe's var. *læta* has precedence. The coloured rays are purple both in this variety and in the type, though Jeffreys describes the latter as red.

T. lineatus var. **minor** Jeffr.—La Rocque, Jersey, but not eroded. This is sold in the Jersey market as "periwinkles," taking the place of *Littorina littorea*, which is there very rare. I have met with several colonies possessing the curious malformed opercula related by Mr. Clark, and Jeffreys' opinion as to its being "an epidemic disease of the operculigerous lobe" appears to me most likely to be the right one. Some of these specimens have no opercula at all.

T. montacuti Wd.—Occasionally cream colour, without any markings. The fry have a rounded base, and closely resemble the same stage of *T. tumidus*. A monstrosity from Guernsey and the Minch has a deep suture and a rounded base.

T. striatus monst. **scalariforme** Jeffr.—Herm Island.

T. exasperatus var. **pyramidata** Jeffr.—Narrower at the base, with a prominent keel to each whorl. I have a specimen from Guernsey, and Dr. Jeffreys' collection contains one from Jersey, found by Mr. Sturges Dodd. Jeffreys was of opinion that *T. exasperatus* was a variety of *T. striatus*, but without giving any tangible grounds for it. Both species are very true to form, rarely varying in hundreds of specimens, and certainly never approaching each other in their specific characters. *T. exasperatus* lives under stones, and *T. striatus* on sea-weeds, both at low water mark. The fry of *T. exasperatus* are rounded at the base, and are marked with spiral pink lines, very

different from the same stage of *T. striatus*. Dr. Watson, who has collected great numbers of both species, says they "can never be confounded so long as the apex is recognisable." There are numerous Continental varieties of both species, but they are mostly variations in colour.

T. miliaris var. **pyramidata** Jeffr.—Scilly, 35 f. (Smart and others); Penzance. A monstrosity of the type from the Moray Frith has a deep suture and convex base, corresponding to the form previously noticed of *T. montacuti*.

T. granulatus Born.—The Diamond ground off Hastings (Langdon)! off Sanda Island, Clyde, a living specimen (Scott); off Lundy Island (from trawlers).

Var. **lactea** Jeff.—Scilly (Burkill and J.T.M.); Mount's Bay.

T. zizyphinus L.—The fry are not umbilicate in any degree, and the top whorl is smooth, the next one having either spiral lines or granules. Jeffreys says in his description that "the ridges on the upper whorls are granulated," but this is the case only with some specimens, and those usually dredged; as often as not they have plain ridges, or the sutural ridges only are beaded. When the whole of the upper whorls are granulated they resemble the same stage of *T. granulatus*, but the latter have the granules smaller and the rows closer together, and especially the nodules appear in uniform oblique rows when viewed with the apex upward. I think Mr. Barlee's "single specimen" from the west coast of Scotland, named by Jeffreys var. *granulifera*, may be an ordinary white one with the juvenile granulations continued on to maturity.

Var. **lyonsii** Flem.—Low-water mark in Cornwall and South Devon, to 110 f.; off Loch Don, Mull, living (A. Brown).

Var. **humilior** Jeffr.—Clyde (A. Brown); Herm Island and Torbay, low water; Scilly; Barra. This variety also occurs white at Scilly.

Var. **lævigata** J. Sow.—Llandulas and Menai Straits (*J. Conch.*, vol. 7, p. 27); Bull Bay, Anglesea, and Port Erin, Isle of Man (Archer); Tenby. Many typical and white specimens are smooth between the sutural ridges, but the main character of this variety is its peculiar shape. It is figured in "British Mollusca," but not well; the last whorl should be much more expanded.

Var. **elata** Jeffr.—Off Aberdeenshire, in deep water (Simpson)! West Orkneys, 45 f. This variety is occasionally smooth, sometimes white, and I have seen one specimen of the monst. *scalariforme*. I have also a specimen which is thin, pearly, and highly iridescent, still containing the animal and operculum, as described by Jeffreys in

the case of a specimen of *T. cinerarius*. Other species have been found occasionally in a similar condition, as well as several instances of *Fusus*. I consider that in all such cases they have been swallowed by fish, partially digested, and then voided again.

The scalariform monstrosity is very pretty and rare. A subscalariform one has been recorded from Menai Straits (*J. Conch.*, vol. 7, p. 28); and Mr. J. E. Cooper found another monstrosity at Jersey having a double operculum.

T. occidentalis Migh.—Aberdeenshire (Simpson)! off Aberdeen, 58 f., and off Montrose, 53 f. ('Triton')! off the Doggerbank, 44 f., 80 miles N.E. by E. from Scarborough. My largest specimen, from the latter district, is half-an-inch in length and breadth.

Var. **pura** Jeff.—Aberdeenshire (Simpson and J.T.M.); Doggerbank.

I have *T. cinereus* Couth., dredged dead, and probably fossil, from Eigg Island, 20 f.; Clyde, 15 f.; Gairloch, 30 f.; Loch Boisdale, 30 f. "A young and dead specimen, but apparently recent," was dredged by the 'Porcupine' off the west of Ireland in 173 f.

Other outlying species are *T. suturalis* Phil. and *T. ottoi* Phil. = *T. rhysus* Wats., from the Færœ Channel (!)

Two specimens of a new species of *Trochus* (*Calliostoma*) were dredged off the south-west of Ireland, in 200 f., in the Royal Irish Academy cruise of 1886, one specimen containing the animal and operculum. It is a handsome shell, unlike any other British species of *Trochus*, and very much resembles the new genus *Gaza* (*G. dædala*) of Watson.

Phasianella pullus L.—There are two forms everywhere, denoting the sexes. The male has the body-whorl more circumscribed, with a slightly longer spire—it leads into the var. *oblonga*, but the latter is still more slender, and the last whorl is not much wider than the penultimate one. That of the female is more globose and has a shorter spire. All the British writers figure the shell of the male as their type, and that, according to Monterosato, is not Linné's.

Var. **oblonga** Jeffr.—Guernsey; South Devon; Weymouth.

Var. **pulchella** Récl.—This very distinct variety is the prevalent form at Guernsey and Herm, where it takes the place of the type, and is also found at various other places. It differs from the type in being much smaller, subconic instead of oval, the spire longer and less rapidly increasing, the last whorl proportionately smaller, and especially in the colour never varying, but being always pink. L. 0·2, B. 0·125 inch. It is easily recognisable at all stages of growth, and also the male and female forms. From var. *oblonga* this is but half the size,

with more rounded whorls and constant colour. I have not met with it at Jersey, where the type is the prevalent form. It is well figured in "Mollusques du Roussillon," and the types of Récluz are in our National Collection.

Lacuna.—Dr. Watson has pointed out in the 'Challenger' Report (p. 579) that "it is unfortunate that in 'British Conchology' the artist has represented *Lacuna* (in the generic plate) with ciliated tentacles," to which it has no claim. He also adds that "in his generic diagnosis of *Lacuna*, Jeffreys does not mention the epidermis." The canal and umbilicus in all the British *Lacunæ* are variable quantities, even in specimens from the same locality. Dr. Watson says he is "not aware what relation this feature of the inner lip and umbilicus has to the economy of the animal's life, but it would seem to be one of some importance, possibly in connection with the eggs, and in that case it is deserving of generic recognition." There seems to be no doubt that in certain species of *Helix*, at any rate, advantage is taken of a large and open umbilicus to afford shelter for the ova or young; but in those genera possessing a small and insignificant one it can serve no purpose. Dr. Mörch seems to have been the first to notice this peculiar provision in the *Endodonta* (a widely-distributed section of *Helix*). And Mr. Andrew Garrett,[1] in adopting *Libera* as another section of *Helix* for some species peculiar to the Society and Cook's Islands, observed that they "are remarkable for their singular habit of ovopositing into their cavernous umbilici." An interesting illustration and some remarks on this habit are given in *Science Gossip* (March, 1894).

L. crassior Mont.—Of Jeffreys' two figures, the obverse one is a subscalariform monstrosity, which is now and then met with; the other is the type.

L. divaricata var. **canalis** Mont.—Horn coloured and thin. Usually occurs at the mouths of rivers, and is analagous to *L. puteolus* var. *auricularis*.

Var. **unifasciata** Mont.—Extremely variable in shape and size. Not always banded; often uniform brown or white.

Var. **gracilior** Metc.—Dornoch Frith. L 0·25, B. 0·15 inch.

A monstrosity of the type from Torbay has a double outer lip.

L. puteolus Turt.—As in *Phasianella*, there are two forms everywhere, indicating the sexes. The female has a larger shell, with a more globular body-whorl, a more prominent spire, and the base obtusely pointed instead of rounded. In the male, the spire is smaller and depressed, and the body-whorl is expanded laterally. All

1 *J. Ac. Philadelphia*, 1881.

the varieties exhibit these two forms. Forbes and Hanley's figures (7 and 8, pl. 72) represent the female, and f. 9 the male form. Specimens occasionally occur in which transverse striæ are plainly observable under the epidermis, but they are not sufficiently characteristic to merit a varietal name. My var. *plicata* was founded on abraded specimens of this form. The young may be distinguished from those of *L. pallidula* by the striæ; the latter are smooth. A dwarf form from Torbay, Mayo, and Iona, does not exceed a line in length and breadth, and a dwarf of the var. *expansa* is smaller still.

Var. **conica** Jeffr.—Brora (Baillie)! Guernsey; Torbay; Mayo; Barra. An extreme or monstrous form of this variety, from Dornoch Frith, has an elongated spire, equalling that of *L. divaricata*, and it could pass for either species. This may be *L. albella* Lov., which is described as intermediate between *L. puteolus* and *L. divaricata*.

Var. **auricularis** Mont.—River Moy, co. Mayo (Miss Warren)!

Var. **clausa** Jeffr.—Found everywhere occasionally with the type.

Var. **expansa** Jeffr.—Guernsey; Penzance; Weymouth; Killala Bay.

L. pallidula DaCosta.—This is much given to sport. As in the last species, it has two forms denoting the sexes, one having a raised and the other a depressed spire. The former is the male, and is shaped as var. *neritoidea*, but is larger. Many of the Guernsey specimens have the canal and umbilicus partially and sometimes entirely closed.

As in many other instances, Jeffreys' type figure is quite different from Sowerby's; the latter would do for the var. *patula* but for the umbilicus, and the former I consider the shell of the male. Forbes and Hanley's are right.

Var. **neritoidea** A. Gd.—Guernsey; Torbay; Tenby; Groomsport; Sutherlandshire. A dwarf of this from Guernsey, living in *Chondrus crispus*, is only a line in length.

Var. **patula** Thorpe.—Smaller. Herm Island; Falmouth.

Var. **albescens** Jeffr.—Canal nearly closed in the adult. Tenby (Span)! Torquay.

Var. **naticiformis** Marshall (*J. Conch.*, vol. 7, p. 250).—Loch Spelve (A. Brown); Guernsey. Captain Brown described another globose form, "found by General Bingham at Dunbar," as *L. retusa*; it is not this, but apparently an immature shell.

[*To be continued*].

Helix aspersa m. sinistrorsum at Lewes.—I took two examples of this shell in my garden on 13th May. They were three-quarters grown, dead specimens, and very bleached, and were found lying within six inches of each other.—C. H. MORRIS, Lewes (*Read before the Society*, June 26th, 1897).

THE MARINE MOLLUSCA OF MADRAS AND THE IMMEDIATE NEIGHBOURHOOD.

By J. COSMO MELVILL and R. STANDEN.

(Read before the Society, Oct. 13th, 1897).

(Continued from page 48).

Natica pulicaria Phil*.—One small individual, exactly agreeing in marking with a large specimen so named in J. C. Melvill's collection. Habitat, hitherto unknown.

Natica (Neverita) chemnitzi Récluz (=*N. ampla* Phil. var.).—Three typical examples. Indian Ocean, China, Japan, Australia, Mauritius.

Natica (Polinices) columnaris Récluz.—Several small specimens. Philippines, Mauritius.

Natica (Polinices) mamilla L.—The numerous specimens we have are medium-sized, and typical. East Indies, Lifu, Central Polynesia, Philippines.

Natica (Ruma) zanzibarica Récluz (=*N. melanostoma* Gm. var.).*—Our specimens are a little more quadrangular than the type of *N. melanostoma*. East Indies, Mauritius, Madagascar, Philippines, Western Polynesia.

Sigaretus javanicus Gr.—Some good examples. East Indies.

Sigaretus neritoides L.—Several examples of this common East Indian *Sigaretus*, in a very good state of preservation. Some confusion attends the limitation of the various forms of this genus, and Tryon considers *S. javanicus* and *S. neritoides* identical.[1] We can hardly agree with him.

Sigaretus (Catinus) planulatus Lm.*—Several; easily distinguished by its smooth, flattened surface. Australia, Philippines, Zanzibar.

Family *IANTHINIDÆ*.

Ianthina globosa Sw.—A beautiful and perfect example, pale violet in colour.

Family *SCALARIIDÆ*.

Scalaria (Scala) tenuicostata Sow.—Quite perfect and very beautiful, the ribs being very closely set. Japan.

Scaliola bella A. Ad.—One, seemingly identical with this Japanese species. Our example is only eight whorled, however, as against nine. It may very likely be an undescribed form, of which more material is wanted before deciding.

Aclis eoa Melvill.*—One, agreeing with the type from Bombay.

1 Man. Moll., vol 8, p. 55.

FAMILY *EULIMIDÆ*.

Apicalia holdsworthi H. Ad.—Seven specimens of this interesting Stylifer. Ceylon.

FAMILY *PYRAMIDELLIDÆ*.

Obeliscus pulchellus A. Ad.* Japan, Loyalty Islands (Hadfield).

Obeliscus terebellum A. Ad.—Very perfect. Antilles.

Syrnola maderaspatana M. & S., *vide antea*, p. 32.

Pyrgulina interstriata Sow.—A few, in poor condition, seemingly identical with Bombay and Upolu examples in J. C. Melvill's collection.

Pyrgulina kreffti Angas.—One, of what may be this Australian form.

Turbonilla candida (Ad.)—One fine shell, in all respects agreeing with examples dredged by Mr. F. W. Townsend in the Arabian Sea (Karachi, etc.)

Turbonilla coromandelica M. & S., *vide antea*, p. 32.

Cingulina spina Cr. Fisch.—Many examples of an elegant species.

FAMILY *NERITIDÆ*.

Nerita crassilabrum E. Sm.—Several. Red Sea, Indian Ocean, Natal, Singapore, China, Philippines, Fiji Islands.

Nerita gemmulata Rv.—Three specimens, agreeing well with description and examples in British Museum. Habitat hitherto unknown.

Nerita haustrum Rv.—A black Nerite, finely transversely sulcate. Tryon considers this synonymous with *N. yoldi* Récl.—which, like some other West Indian species is subject to an erosion which excavates the white portions, leaving the black in relief. Red Sea, Indian Ocean, Hong Kong.

Nerita histrio L.—Some handsome, well-grown individuals in very fine condition. Australia, Mauritius, East Africa, East Indies, Philippines, Polynesia.

Nerita polita L.*—A number of examples, showing the usual variation in colour so notable in this common but beautiful species. Red Sea, Indian Ocean, Philippines, Mauritius, Loyalty Islands, Polynesia.

Nerita (Thelicostyla) albicilla L.*—Several of this widely-distributed species. Natal, Singapore, China, Philippines, Loyalty and Fiji Islands, Red Sea, Indian Ocean, &c.

Nerita (Peloronta) plicata L.—Some typical specimens. Formosa, Indian Ocean, Polynesia, Loyalty and Sandwich Islands.

Neritina mertoniana Récl.—Many specimens. This is probably, as considered by Tryon, a variety of *N. ualanensis* Less., which closely mimics the common West Indian *N. virginea*, L., and is equally variable in its markings. Indian Ocean to Philippines and Polynesia.

FAMILY *TURBINIDÆ*.

Phasianella (Orthomesus) variegata Lm.—We give the above name to two examples of a small, smooth, closely interruptedly white-lined *Phasianella*, with some little doubt, the exact variety not being found in the Mus. Brit., but it seems near *P. nivosa*, *P. lentiginosa*, and other quasi species now aggregated by Pilsbry under the above name.[2]

Turbo (Senectus) radiatus Gm.—Many, in all stages. Red Sea to Madagascar, eastward to New Caledonia, Nicobar, Philippine, and Loyalty Islands.

FAMILY *TROCHIDÆ*.

Polydonta maculata L. var.—Several specimens of this protean species, differing from the type in some respects. Philippines, Singapore, Fiji Islands, Indian Ocean, Kingsmill Island.

Polydonta veneta Rv.—A few examples of a species allied to *P. radiata* Gm. but without teeth on the columella. Moluccas (Rv.).

Polydonta (Carinidea) radiata Gm.*—Many, in all stages of growth. Red Sea, Indian Ocean, Singapore, Madagascar, Ceylon.

Umbonium vestiarium L.*—A large number of specimens. apparently not so variable or light in colour as examples from the Western shores of India. The var. *rosea*, however, is present, and the variety with slaty black umbilical callosity. Indian Ocean, Ceylon to Java, Philippines, Singapore, New Irealand.

Gibbula nuclea Phil.—Typical specimens. New Caledonian Archipelago, Japan, Fiji Islands (Garrett).

Minolia biangulosa A. Ad.—An abundant South Indian *Minolia*, the whorls being excessively angulate. We have lately seen dredged from Ceylonese waters by Capt. Tindall, of the s.s. "Patrick Stewart," over a hundred, showing no variation whatever. Siam.

Minolia variabilis A. Ad.—Also extremely abundant, and, as its name would imply, variable. Persian Gulf.

Calliostoma interruptum Wd.—We have identified this by Reeve's figure and description, not having seen any named individuals. It is an elegant little trochiform shell, prettily longitudinally banded, and articulately filletted at the periphery. Habitat hitherto unknown.

2 Tryon, Man. Conch. vol. 10, p. 179.

Calliostoma tranquebaricum Chemn.—Many, all fine, and exhibiting little variation in marking, none in sculpture. Tranquebar, Pondicherry, Vizagapatam.

Euchelus atratus Gm.—Darker in colour than those in the British Museum. Nicobar, Fiji, and Philippine Islands, Vanikoro, Moluccas, Sorong, Singapore.

Euchelus tricingulatus A. Ad.—Several of a pretty fawn-coloured shell. Malacca, Singapore.

Euchelus foveolatus A. Ad.—One or two specimens of a very distinct little shell, with coarsely latticed sculpture. Philippines, Lord Hood's Island, Paumotu, and Fiji Islands.

Euchelus horridus Phil.*—Rather small and poor, examples of an abundant Eastern shell. Bombay, Mediterranean.

Euchelus indicus A. Ad.*—Large and well marked, and in good quantity. Bombay.

Euchelus proximus A. Ad.*—Only one, but fine. Tryon considers this a form of *Trochus asper* Gm., though, typically, this is more elevated, with smaller and more numerous spirals. Indian Ocean.

Euchelus scaber P. Fisch.—Three typical specimens. Indian Ocean, Singapore (Archer).

Euchelus tricarinatus Lm. (=*E. quadricarinatus* Chemn. var.)*—Several; Indian Ocean.

FAMILY *DELPHINULIDÆ*.

Liotia varicosa Rv.—Occurs also at the Philippines and Loyalty Islands (Hadfield).

FAMILY *CYCLOSTREMATIDÆ*.

Cyclostrema pulchellum Dkr.—Identical with Japanese examples. Singapore, Australia.

FAMILY *HALIOTIDÆ*.

Haliotis (Teinotis) asinina L.—Several. China, Japan, Australia, East Indies.

Haliotis glabra Chemn.—Several; a smooth species, readily distinguished by its oval form and the green arrow-shaped blotches on the surface. Philippines, Australia.

Haliotis varia L.—Three examples; a well-named species, of wide distribution. Philippines and Australia to China, Mozambique, Red Sea, Mauritius, Ceylon, Nicobar Islands, Malay Archipelago.

FAMILY *FISSURELLIDÆ*.

Fissurella bombayana Sow.*—Two; quite typical.

Fissurella (Glyphis) lima Sow. — Quite typical. Bombay, Arakan.

Fissurella (Glyphis) ruppelli Sow.—Some characteristic examples. Mauritius, Red Sea, Cape of Good Hope.

Emarginula costulata Dh.—One Madras example, and three from Bombay (Abercrombie) hitherto unnamed in J. C. Melvill's collection, with some slight doubt we refer as above. Id. of Réunion.

Subemarginula (Clypidina) notata L.*—Very prettily marked with slatey indigo concentric lines and dashes. Tryon remarks that the habitat, West Indies, given by Adams is doubtful, and that it belongs rather to an East Indian type, an opinion borne out by this record of ours from Madras, as well as a former one from Bombay.

Scutus *cf.* corrugatus Rv.—Only small forms. Japan.

FAMILY *ACMÆIDÆ*.

Acmæa saccharina L.—Some fairly typical specimens. Amboyna to Japan ; Fiji Islands.

FAMILY *PATELLIDÆ*.

Helcioniscus variegatus Rv. (=*H. rota* Gm. var.).—Many specimens, agreeing with Tryon's definition. Suez and Mozambique (Rv.) ; Id. of Réunion ; Madagascar (Dall).

CLASS POLYPLACOPHORA.

FAMILY *CHITONIDÆ*.

Ischnochiton sp.—Two small species which have not yet been worked out, but both are probably new to science. We shall hope to say more about them in a subsequent paper.

CLASS SCAPHOPODA.

FAMILY *DENTALIIDÆ*.

Dentalium octogonum Dh.—Several specimens.

Antalis fissura Lm.—One perfect example of this rare species.

Cadulus anguidens M. & S., *vide antea*, p. 32.

CLASS PELECYPODA.

ORDER TETRABRANCHIATA.

FAMILY *OSTREIDÆ*.

Ostrea denselamellosa Lischke.—Two characteristic examples, agreeing with Japanese specimens in the British Museum, and J. C. Melvill's collection.

FAMILY *ANOMIIDÆ*.

Anomia humphreysiana Rv.—Only one valve, but characteristic.

FAMILY *LIMIDÆ*.

Lima squamosa Lm.—Several, approaching the typical Red Sea form. Red Sea, Mediterranean.

Lima (Mantellum) angulata Sow.—Several, resembling exactly specimens in the British Museum from Panama. Bay of Caraccas.

FAMILY *PECTINIDÆ*.

Amussium japonicum Gm.—Quite typical. A series of adult and young. China, Japan.

Amussium pleuronectes L.—Typical examples, in all stages of growth. China.

Pecten asper Sow.—This is one of the most interesting of the recent Pectinidæ. The markings are peculiar, as is the sculpture, and well represented in plate i. of Reeve's Conch. Icon. New Guinea (Hinds).

Pecten crassicostatus Sow.—Several typical examples. Japan.

Pecten cristularis Ad. & Rv.—Some pretty specimens. Distributed throughout the Indian Ocean.

Pecten singaporinus Sow.*—Only one, a finely-coloured but small specimen.

Pecten sinensis Sow.—Several examples, in various stages. China.

Pecten squamatus Gm.—Typical examples of this inequilateral Philippine Island species.

Pecten tranquebaricus Lm.—Small but perfect, and highly characteristic, shewing the peculiar acute auricles, and of a pale ochraceous colour. Coasts of Tranquebar.

Pecten (Chlamys) limatulus Rv.—Three specimens of this delicate and elaborately-sculptured species. Mauritius.

FAMILY *AVICULIDÆ*.

Avicula argentea Rv.—A smooth, dark olive shell. Also reported from the coasts of Guinea.

Avicula formosa Rv.—Through a lens, this shell, much encrusted as it is with nullipores, etc., is seen to be most delicately concentrically lirate.

Avicula iridescens Rv.—Two specimens. Moluccas.

Avicula scabriuscula Rv.—Two; characteristic. Australia.

Margaritifera anomoides Rv.—Many; a decided species, semitransparent, white, rayed with pale green in a manner very unusual in this genus. Philippines.

Margaritifera margaritifera L.—Medium and juvenile examples of this abundant tropical species.

Margaritifera prætexta Rv.—Many; of a peculiar livid fawn colour, the pale oblong blotches with which the shell is rayed are curiously wrinkled across with opaque-white lines. Philippines.

Margaritifera squamulosa Lm.—Young examples, which are probably juvenile forms of *M. flabellum* Rv.; if so, the Lamarckian name, having priority, must stand. They are beautifully concentrically squamate, the squamæ long and very fragile. Tiger Bay.

Margaritifera tegulata Rv.—Very delicate and beautiful Roundish, thin, and thrice or four times longitudinally radiate. We also have the young form, pale green, and very oblique, with the characteristic radiate lines. Also from Moreton Bay.

Margaritifera vexillum Rv.—Many, of a prettily zig-zag marked Avicula, but all in quite young condition. Ceylon.

Perna femoralis Lm.—Several, quite typical. Philippines.

Perna isognomon L.—A few of this common East Indian form. Philippines.

Pinna attenuata Rv.—Two specimens; typical. Moluccas.

FAMILY *MYTILIDÆ*.

Mytilus viridis L.—Small, but well coloured.

Modiolus metcalfei Hanl.—A delicate species, very perfect in condition. Philippines.

Modiolus ramosus Hanl.—Two specimens. Celèbes.

Lithophagus stramineus Dk.—Two. West Indies.

Lithophagus teres Phil.—Three small sized specimens. A shell of simple form and sculpture. Mazatlan.

Modiolaria cœnobita Vaill.—An interesting form, described by Vaillant from the Gulf of Suez.

FAMILY *ARCIDÆ*.

Arca imbricata Poli.—Very similar to the European *A. tetragona* L. Aden (Brit. Mus.), Mediterranean, East Indies.

Arca inæquivalvis Brug.*—Many, in all stages. Indian Ocean, Persian Gulf.

Barbatia fusca Brug.—A quantity of this common Philippine species.

Barbatia lima Rv.—Two or three only. Philippines.

Barbatia (Acar) pusilla Sow.—A neat squarrose shell, identical with Tasmanian specimens received by the British Museum from Mr. J. H. Ponsonby.

Barbatia (Venusta) lactea L.*—Of very wide distribution, being a common British and European species. Also from Bombay and Arakan in the Blanford collection (Mus. Brit.). Mediterranean.

Scapharca clathrata Rv.—Several. Philippines (Cuming), Aden (Brit. Mus.).

Scapharca rhombea Born.*—A solid handsome shell. China, Ceylon.

Parallelipipedum tortuosum L.—Three specimens of this extraordinary shell. Singapore, Malacca.

Cucullæa concamerata Chemn.—Two, very fine. Indian Ocean (Paetel).

Pectunculus taylori Angas.—Two odd valves, both quite distinctive and full grown. The geographical distribution includes Ceylon.

FAMILY *NUCULIDÆ.*

Nucula mitralis Hinds.—A glossy and very oblique small species. Also from Malacca.

Nuculana cuspidata A. Gd.—Many beautiful examples, absolutely identical with a solitary specimen, in the British Museum, with no locality. Gould's types came from North America, and it is strange to have it reported from Madras.

FAMILY *CARDITIDÆ.*

Cardita canaliculata Rv.—One example only, and that in juvenile condition. Those in the British Museum are from the Philippines.

FAMILY *TRIDACNIDÆ.*

Tridacna gigas L.—One small specimen in a worn condition. Philippines.

FAMILY *CARDIIDÆ.*

Cardium (Acanthocardia) asiaticum Chemn.—Several, in various stages. China, Nicobar Islands.

Cardium (Trachycardium) rugosum Lm. (= *C. flavum* L.). Several. Madagascar, Ceylon, Nicobar Islands.

Cardium (Cerastoderma) latum Born.*—Some characteristic examples. Philippines (Cuming).

Cardium (Bucardium) coronatum Spengl.—Typical specimens. China.

Cardium (Bucardium) fimbriatum Wood.—Many examples. China.

Cardissa (Lunulicardia) subretusum Sow.—Several. These are a small form of what Paetel and others consider a variety of *C. retusum* L. Red Sea.

FAMILY *VENERIDÆ.*

Meretrix casta Chemn.—A plain, heavily moulded, white porcelain *Meretrix,* with olive-ochraceous epidermis. A common Indian shell.

Meretrix castanea Lm. (=*M. morphina* Lm. var.)—Several specimens. Singapore, Philippines.

Callista umbonella Lm.—Many specimens of this variable shell. Brazil (Cuming), Red Sea.

Crista divaricata Chemn.*—Many specimens. Mozambique (Hanley), Red Sea, Philippines (Cuming).

Crista gibbia Lm.—One of our examples is unusually obese and large. Philippines, Red Sea.

Crista pectinata L.—Many, in all stages of growth. Indian Ocean, Philippines, Red Sea.

Circe personata Dh.—A delicate example of this somewhat common Indian species.

Sunetta meroë L. (=*S. picta* Schum.).—Two; a pretty species, and extremely variable in colour. Philippines.

Sunetta seminuda Rv.—One beautiful specimen, pale flesh coloured, with epidermis. Moluccas (Cuming).

Dosinia modesta Rv.—A few typical specimens. Spain (Paetel).

Dosinia radiata Rv. (=*Artemis amphidesmoides* Rv.).—Three or four, but only one exhibiting the characteristic rayed marking, so conspicuous in the figure in Conch. Icon. (pl. vii., fig. 37). The geographical distribution would appear to be wide, extending from the mouth of the R. Gambia, W. Africa, eastwards.

Dosinia salebrosa Römer.—A pure white shell, very delicately concentrically ribbed. Specimens in British Museum from Ceylon.

Chione graphica Lm. (=*Cytherea petechialis* Lm. var.).—Also reported from Sumatra and Japan.

Chione (Omphaloclathrum) gibbosula Dh.—A few examples, in good condition.

Chione (Omphaloclathrum) layardi Sow.*—Not, perhaps, quite typical. Found all round the coasts of India, Persian Gulf, and extending to the Andaman Islands. A very abundant Indian shell, occurring in every collection we have received from that country.

Chione (Omphaloclathrum) puerpera L.—Two; very large and fine, and well marked. Philippines.

Chione (Omphaloclathrum) scabra Hanl.—A minute, but elegantly chased *Chione*, of which there are some dozen examples in the collection. Philippines, New Holland.

Anaitis calophylla Hanl.—Two small but characteristic specimens.

Tapes (Textrix) malabarica Chemn.—Typical. Moluccas.

Tapes (Textrix) sulcosa Phil.—Remarkably fine, with the purple rays, and grey spots very distinct. Australia.

Tapes (Textrix) textrix Chemn.*—Some rather small specimens of ordinary character.

Tapes (Hemitapes) pinguis Chemn.*—A common Indian form. In the Römerian arrangement adopted in some museums this species is known as *Chione pinguis*. Ceylon, Tranquebar.

Irus macrophylla Dh.—Quite young, no mature examples. A beautiful species, much lighter, more rounded, and having the laminæ more produced than our British *V. irus*; it also differs in being foliated and cancellated. Philippines.

FAMILY *PETRICOLIDÆ*.

Petricola lithophaga Retr.—Indistinguishable from European specimens.

FAMILY *DONACIDÆ*.

Donax (Hecuba) scortum L.*—Several, in various stages of growth. Cape of Good Hope.

Donax (Latona) abbreviatus Lm.*—Many examples. Philippines.

Donax (Latona) cuneatus L.—Four specimens. Ceylon.

FAMILY *PSAMMOBIIDÆ*.

Gari anomala Dh.—One small but perfect example; also reported from Australia and New Holland.

Sanguinolaria hendersoni M. & S., *vide antea*, p 33.[1]

FAMILY *SOLENIDÆ*.

Siliqua radiata L.—Very beautiful and well-coloured examples. Sumatra.

FAMILY *MESODESMATIDÆ*.

Mesodesma (Paphia) trigona Dh.—Large examples. Habitat hitherto unknown.

FAMILY *MACTRIDÆ*.

Mactra attenuata Dh.—Several; somewhat attenuated posteriorly, and of a peculiar dark livid ash-violet, within and without. Habitat hitherto unrecorded.

Mactra fasciata Lm.—Several; agreeing with Reeve's description.

Mactra spengleri Born (=*M. lævis* Chemn. var.).—Our specimens are rather young, but agree with the description and figure in Reeve.

Schizodesma spengleri L.—Several typical examples.

FAMILY *MYIDÆ*.

Corbula modesta Hinds*.—Five, all young, but agreeing with Bombay specimens received from Mr. Abercrombie. Philippines.

Corbula sulcata Lm.—Three young but recognisable specimens. Senegal.

FAMILY *PHOLADIDÆ*.

Martesia striata L.—A drift species, its distribution therefore extending over the tropics. The "Challenger" specimens in the British Museum came from the Arafura Sea.

1 The description of this species was published on the cover of the Journal on Jan. 1st., 1898.—Ed.

FAMILY *LUCINIDÆ*.

Lucina pisum Phil.—About eight examples of a highly chased and ribbed small shell, very rotund, evidently of wide distribution, as it has been dredged both at Port Essington, Australia, and Singapore.[1]

Lucina (Cyclas) semperiana Issel.—A minute *Lucina*, with some extraneous resemblance to the last (*L. pisum*). Like many of the genus, it is of wide distribution, being reported from Mazatlan (Paetel), and Gulf of Suez (Mus. Brit.)

Tellina (Tellinella) deltoidalis Lm.—Some very fine examples, quite typical in form. Australia, New Zealand.

Tellina (Tellinella) rostrata L.—Few, rather poor. Philippines.

Tellina (Tellinella) undulata Hanl.—Young examples only, but quite characteristic. West Columbia.

Tellina (Arcopagia) savignyi A. Ad.—Karachi (Townsend), and probably all round the Indian coasts. Red Sea (Paetel).

Tellina (Tellinula) valtonis Hanl.—Very thin and delicate, white, exhibiting a wonderfully beautiful iridescence.

Tellina (Tellinides) opalina Sow.—One specimen, agreeing with figure in Conch. Icon. Moluccas.

FAMILY *CLAVAGELLIDÆ*.

Brechites vaginifera Lm.—One, somewhat worn and broken, but evidently this well known Red Sea species.

Note on Cypræa rashleighana.—The above Cowry was described in 1887,[2] and in the following year was re-figured, the original description being repeated in the "Survey of the Genus *Cypræa*, 1888."[3] Although the habitat was queried it seems probable that the type came from the neighbourhood of Hongkong. Since this time three or four specimens have occurred amongst the Hadfield Mollusca from Lifu; these, however, are either too young or in a not very satisfactory state of preservation. My object in alluding to this species at the present opportunity is to call attention to a very beautiful and large example which has been for years in the National Collection at South Kensington, having formed part of the Cumingian stores. This was figured by Mr. Lovell Reeve[4] as a stunted form of *C. tabescens* L., but has been overlooked by Sowerby[5] and by Mr. Raymond Roberts in the "Monograph of *Cypræa*."[6] Rather blindly following Reeve in 1888,[7] I signalised this as var. α of *C. tabescens* under the proposed varietal name of *latior*. Mr. Edgar Smith being disposed to allow it specific rank, labelled it in the National Collection "*latior* Melv." Last year, however, it was closely examined by us both, in comparison with the original type of *C. rashleighana*, and pronounced identical. The pyriform shape, different dentition, narrower aperture, small clearly defined dark-brown lateral punctuation, with other characteristics, differentiate this species from its allies, C. *tabescens*, *C. teres*, and *C. interrupta*.—JAMES COSMO MELVILL (*Read before the Society*, April 13th, 1898).

1 Reeve, Conch. Icon., pl. xi., fig. 66. 2 *J. Conch.*, vol. 5, p. 288. 3 *Manch. Mem.* (4), vol. 1, p. 218, 219. 4 Conch. Icon., pl. 14, no. 66a, 1845. 5 Thes. Conch. 6 Tryon, Man. Conch., vol. 7, 1885. 7 *Loc. cit.*, p. 218.

NOTES ON SOME ANGLESEA LAND AND FRESHWATER MOLLUSCA.

By CHARLES OLDHAM.

(Read before the Society, December 4th, 1895).

In the early part of July, 1895, I spent a short holiday at Cemmaes, a small village on the north coast of Anglesea, about five miles west of Amlwch, devoting some of my leisure to the investigation of the land and freshwater shells of the district. Most of my collecting was done close to Cemmaes village, but I visited two sheets of water, Llynfelinant and Llynllygeirian, which lie some three miles inland. The results, however, were somewhat disappointing, as their stony beds and the consequent lack of aquatic vegetation make them ill-suited to the requirements of freshwater mollusca.

The whole of the northern part of Anglesea is composed of metamorphic rocks of chlorite, mica-schist and gneiss, with small quantities of greenstone and serpentine. Limestone occurs close to Cemmaes and is quarried in places between the harbour and Llanbadrig church. The country is almost entirely treeless and, where not under cultivation, is occupied by gorse-covered commons. A snipe-bog near the sea, about half-a-mile west of the village, proved to be the best collecting ground, and yielded *Carychium* and various species of *Hyalinia* and *Vertigo* in considerable numbers.

The weather was hot and dry during my visit, and had been so for some time previously. Such species as *H. virgata* and *H. acuta* were consequently difficult to find, but, had the conditions been more favourable, other forms would doubtless have been secured, and my total of fifty-three species would probably have been greater.

Mr. J. W. Taylor has kindly looked over the shells collected and has confirmed my identification of the various species.

Arion ater.—Very common.

Var. **brunnea.**—Common on roadsides and hedges.

Var. **plumbea.**—Several in a ditch near the village.

Var. **pallescens.**—Several specimens with the last-named variety.

A. subfuscus.—One under a stone in the village.

A. minimus.—Plentiful in a wet place on the cliffs.

A. circumscriptus.—Several in fields near the village.

Amalia gagates var. **plumbea.**—One in a garden at Cemmaes.

Var. **rava.**—One at the foot of a wall near the village.

Limax maximus var. **ferrussaci.**—Two in a garden at Cemmaes; one in Llanbadrig Churchyard.

Var. **fasciata.**—Several in a garden at Cemmaes.

L. marginatus.—One in a limestone quarry near Llanbadrig Church.

Agriolimax agrestis.—Very common.

A. lævis.—Fairly common. Wet place on the cliffs; the snipe-bog; damp places in fields; and in a wood near Rhos Goch station.

Vitrina pellucida.—Dead shells on the cliffs, and in Llanbadrig Churchyard.

Hyalinia cellaria.—Moderately common.

H. alliaria.—Llanbadrig Churchyard.

H. nitidula.—Fine, light-coloured specimens in a nettle-bed near the village.

H. crystallina.—Three specimens near the village.

H. fulva.—Fine and abundant in the snipe-bog.

H. nitida.—Abundant in the snipe-bog.

Helix rotundata.—Fairly common.

H. aspersa.—Very common.

H. nemoralis. — Plentiful on banks by the roadside between Cemmaes and Llanfechell; pink and yellow shells, with the band formula 12345, being equally common.

Var. **bimarginata.**—Two well-marked examples of this form.

Var. **rubella.**—00300. As plentiful as the typical form.

Var. **libellula.**—00000 and 00300. A few of each form.

H. hortensis.—In the same locality as *H. nemoralis*, but not so plentiful. The typical five-banded form was the commonest, but a few individuals with the formulæ (12)3(45) and (12)345 were collected.

Var. **lutea** 00000.—This form was about as plentiful as the type.

H. rufescens.—In a nettle-bed near the village.

Var. **rubens.**—With the type.

H. hispida var. **hispidosa.**—Plentiful.

H. caperata.—Plentiful on the cliffs and in fields near the sea.

Var. **ornata.**—One specimen on the cliffs.

H. virgata.—Fairly common on the cliffs and on turf walls near the village.

Var. **lutescens.**—Near Llanbadrig Church. All the specimens have a single interrupted band on the periphery.

Var. **alba.**—Near Llanbadrig Church and on turf walls in the village.

H. acuta.—Dead shells on the cliffs near Llanbadrig Church.

Pupa anglica.—Plentiful in a wet place on the cliffs. Some short-spired examples are homologous with vars. *curta* and *brevis* of *P. cyclindracea* and *P. muscorum* respectively.

P. cyclindracea.—Common on stone walls and in lime-stone quarries.

Var. **curta**.—With the type.

Vertigo antivertigo.—Plentiful at the roots of *Iris pseudacorus* in the snipe-bog. Two specimens on the same plant in a coppice near Rhos Goch station.

V. pygmæa.—A few with *P. anglica* on the cliffs. Common in the snipe-bog.

V. substriata.. — One in limestone quarry, near Llanbadrig Church. Several in the snipe-bog.

V. edentula. — Several in limestone quarry, near Llanbadrig Church. One in the snipe-bog.

Clausilia perversa.—One on the cliffs.

Cochlicopa lubrica.—Fairly common.

Var. **lubricoides**.—One or two with the type.

Succinea elegans.—Plentiful. On the cliffs; in ditches and the snipe-bog; in a coppice near Rhos Goch station.

Carychium minimum.—Plentiful in the same localities as the last species.

Planorbis albus.—On *Potamogeton* in Llynfelinant.

P. spirorbis.—In a ditch near the village with *B. hypnorum* and *P. pusillum*..

P. umbilicatus.—Plentiful in ponds and ditches.

P. contortus.—.One specimen in the snipe-bog.

Bullinus hypnorum.—Plentiful in ditches and the snipe-bog.

Physa fontinalis —Ditch near Camlyn Bay.

Limnæa peregra.—Plentiful.

L. auricularia var. **acuta**.—Ditch near Camlyn Bay.

L. palustris.—Plentiful in ditches and the snipe-bog. In a coppice near Rhos Goch station.

L. truncatula.—Plentiful in ditches.

Var. **minor**.—In a wet place on the cliffs.

Ancylus fluviatilis.—Stream near Camlyn Bay.

Valvata piscinalis.—Plentiful in ponds and ditches.

V. cristata.—Plentiful on *Lemna* in a ditch near Camlyn Bay.

Sphærium corneum.—Llynllygeirian. Sparingly in ditches near Cemmaes.

S. lacustre.—Pond by the road side near Llanflewin.

Pisidium fontinale.—Plentiful in ponds, ditches, and the two lakes.

Var. **pulchella**.—Fine and plentiful in a shallow pond near the village.

P. pusillum.—Plentiful in the same localities as *P. fontinale*. Large specimens in a damp place in a coppice near Rhos Goch station.

Var. **obtusalis**.—Fine; in a ditch in the snipe-bog.

P. milium.—Ditch near Camlyn Bay. Llynfelinant and Llyn-llygeirian.

In 1891 and 1892, I collected some shells in the neighbourhood of Rhos Neigir, on the south-west coast, near Holyhead, and met with the under-mentioned forms, which I did not obtain at Cemmaes. There are in this district several lakes fringed with reed-beds and belts of water-lilies, which are better adapted for aquatic species than those near Cemmaes. The long stretch of sand dunes in Cymmeran Bay also affords somewhat different conditions to the rocky coast of the north of the island.

Helix pulchella.—Sand dunes near Rhos Neigir.

H. itala.—Sand dunes, Cymmeran Bay.

H. acuta var. **bizona.**—With the last.

Pupa muscorum.—Sand dunes near Rhos Neigir.

Planorbis nautileus.—Small pond near Llyn Penryngwylanod.

Var. **crista.**—With the type.

Limnæa stagnalis.—Llyn Maelog.

Var. **fragilis.**—Llyn Main.

Velletia lacustris.—On leaves of *Nymphæa* and *Nuphar* in Llyn Penryngwylanod.

Anodonta anatina.—Llyn Maelog and Llyn Penryngwylanod.

Mr. J. G. Milne, who has also collected at Rhos Neigir, notes the following:—

Helix pygmæa.—Llanvaelog Common.

Physa fontinalis var. **albina.**—Llyn Main.

Ancylus fluviatilis var **albida.**—Llyn Maelog, with the type.

Sphærium corneum var. **flavescens.**—Llyn Maelog.

Paludestrina jenkinsi near Middlesbrough.—In the early spring of 1897 I found some exquisitely constructed caddis cases made of the empty valves of *P. jenkinsi*, in a beck, between Thornaby and Middlesbrough. Last summer I visited the neighbourhood again, and found a few immature living specimens of *P. jenkinsi* on the *Elodea canadensis*. Later, in the autumn, I thoroughly investigated the same stream, and discovered in a bend sheltered by a luxuriant growth of *Arundo phragmites*, a large colony of fully-developed specimens. They were literally crowded together. With each draw of the collecting-scoop I was able to secure twenty or thirty individuals. They were found in company with *Planorbis umbilicatus*, *Physa fontinalis*, and *Limnæa peregra*. So far, the var. *carinata* has not been seen, all the specimens being uncarinated forms. The beck named flows into the river Tees, and I note the conjecture of Mr. L. E. Adams, in his admirable Manual, as to the shells being imported in Baltic timber. On inquiry, I have ascertained that Baltic timber is constantly brought into the Tees, and it may be that the colony I have found has been imported in this way to this locality.—A. HANN, Thornaby, April 16th, 1898 (*Read before the Society*, May 11th, 1898).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

270th Meeting, April 13th, 1898.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted :

The Nautilus, vol. 11, no. 11 ; Dates of Publication of the papers constituting vol. 19 of the Proceedings of the United States National Museum ; Abstract of Proceedings, Royal Society of New South Wales, Nov., Dec., 1897 ; The Proceedings and Transactions of the Nova Scotian Institute of Science, vol. 9, part 3 ; Transactions of the Yorkshire Naturalists' Union, part 21 ; The Naturalist, no. 495 ; La Feuille des Jeunes Naturalistes, ser. 3, vol. 28, nos. 330 and 331 ; Science Gossip, n. s., vol. 4, nos. 44—47, 1898 ; The Irish Naturalist, vol. 7, no. 4 ; The Annals of Scottish Natural History, no. 28, 1898; Land and Freshwater Mollusca of the District between Ashton-under-Lyne and Oldham, by Fred. Taylor ; Catalogue de la Bibliothèque des Jeunes Naturalistes, Fasc. 1—3, 1887.

New Members Elected.

Mr. John Wishart, B.Sc., 25, Mount Street, Aberdeen

Mr. Henry Woods, M.A., F.G.S., St. John's College, Cambridge.

Candidate Proposed for Membership.

Mr. B. R. Lucas.

Resignations.

Rev. E. G. Alderson ; Mr. B. Sturges Dodd ; Mr. J. Chadwick.

Papers Read.

"*Hyalinia cellaria* in Walworth," by the Rev. J. W. Horsley.

"Note on *Cypræa rashleighana*," by J. Cosmo Melvill.

Exhibits.

By Mr. J. Cosmo Melvill : The type specimen of *Cypræa rashleighana* ; also *C. tabescens*, *Strombus mauritiana*, *S. luhuanus*, and a new species of *Strombus*[1] [*S. belutchiensis*] from Karachi.

By Miss M. Lodder : A small series of rare Tasmanian marine shells, including *Eulima mucronata*, *E. auger*, *Stylifer lodderæ*, *Liotia lodderæ*, *Trophon brazieri*, *T. petterdi*, *Liotia angasi*, *Terebra brazieri*, *Mathilda australis*, *Clathurella lallemantiana*, *Mangilia picta*, and *M. alucinans*.

By Mr. W. Moss : *Helix hortensis*, from Lincoln.

By Mr. R. Standen : *Strombus urceus* from Ceylon, also a very fine and well marked scalariform example of the same species (from the collection of Mr. R. Welch).

Mr. R. Welch sent for distribution a large number of *Paludestrina jenkinsi*, collected by Mr. G. N. Milne, of Culinore, on the Foyle, co. Donegal.

271st Meeting, May 11th, 1898.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted :

The Naturalist, no. 496 ; The Irish Naturalist, vol. 7, no. 5 ; The Nautilus, vol. 11, no. 12, vol. 12, no. 1 ; Science Gossip, vol. 4, no. 48 ; Journal de Conchyliologie, vol. 45, no. 3 ; "Official Guide to County Down and the Mourne Mountains," by R. Lloyd Praeger ; "A classified Catalogue with localities of the Land Shells of America north of Mexico," by Henry A. Pilsbry and Charles W. Johnson ; "Om Bukkenfjordens Echinodermer og Mollusker," and "Skrabninger i Vaagsfjorden og Ulvesund, ytre Nordfjord," by James A. Greig ; (*from the authors*).

New Member Elected.

Mr. Bernard Richard Lucas, 3, Dyar Terrace, Winnington, Northwich, Cheshire.

1 *Mem. Manchester Soc.*, vol. 42, no. 4, p. 37, 1898.

Papers Read.

"Note on a new variety of *Testacella maugei* Fér.," by W. E. Collinge.

"Note on *Clausilia cærulea* Fér., in Hants.," by L. E. Adams.

"Note on *Paludestrina jenkinsi* near Middlesbrough," by the Rev. A. Hann.

Exhibits.

Dr. R. F. Scharff sent for exhibition a series of very fine living examples of *Geomalacus maculosus* recently collected by him at Glengariff, Co. Kerry. A number of specimens in various stages of growth were also shown on behalf of Mr. R. Welch, who had within the past few days collected this slug in quantity at Kenmare, Co. Kerry, where it occurs on every wayside dyke to the south of the bay.

By Mr. Thos. Edwards: *Valvata piscinalis* var. *depressa*, from Bradgate Park, Leicester; *Anodonta cygnea* var. *incrassata*, from a pond at Towerby Hall, near Leicester; a very fine example of fossil wood bored by *Teredo antenautæ*, and showing tubes with shell valves *in situ*, from Thanet Sands, Pegwell Bay; *Hydrobia ulvæ*, from Pegwell Bay; and specimens of *Ostrea liassica* attached to an Ammonite and to stems of *Extracrinus briaroides*. In these specimens the curious manner in which the impression of the object to which the shell is attached, is again repeated on the upper valve is remarkably well illustrated. The specimens were obtained within the borough of Leicester, and occurred in the Boulder Clay.

By Mr. R. Standen: *Chorus belcheri* Hinds, from California; and a fine series of *Trophon triangulatus* Carp., in several stages of growth, from California; also specimens of *Teredina personata* from London Clay, and *Teredo antenautæ, in situ*, and sections of same for comparison with Mr. T. Edwards' Thanet specimen—all from the Manchester Museum collections. Also *Unio margaritifera* from the Bundorragha River, Delphi, Co. Mayo, Ireland.

By Mr. W. Moss: *Hyalinia lucida*, from Belfast, collected by Mr. Welch; *H. glabra*, from Whalley, collected by Mr. Wigglesworth; and *H. glabra*, from Highgate Woods, collected by Mr. J. E. Cooper. The first appears from an examination of the genitalia to be identical with the Tenby forms of this species; the radula of one specimen is peculiar, the elongated cutting point on the mesocone of the first lateral tooth on each side the central is absent, and this abnormality is continued the whole length of the radula; a few of the entocones are also bifid, a characteristic often met with in this species. The last are rather different in color from some of the Northern forms; the radula is very variable, particularly in the form of the central tooth; out of 12 specimens examined, three show most remarkable divergence from typical forms, two of these being different from the third; another radula is abnormal in the first lateral tooth on one side only of the central, this tooth lacking the entocone for the whole length of the radula.

By Mr. R. Cairns: Some varieties and choice specimens of *Cypræa testudinaria*, *C. physis*, *C. stolida*, *C. pyriformis*, *C. margarita*, *C. undata*, and others.

Hyalinia cellaria in Walworth.—The other day a drain in my area being blocked, I found it necessary to open the ground in the forecourt, and in so doing found an unsuspected man-hole covered with slabs of stone. When these were lifted I found four fine specimens of *H. cellaria* on the under surface of the stone, where they must have lived always in the dark and exclusively on what a scullery pipe brought down. Walworth is in the densest part of South London, where we live 200 to the acre, and expect to find shells as little as ferns.—J. W. Horsley, St. Peter's Rectory, Walworth, S.E. (*Read before the Society*, April 13th, 1898).

OBSERVATIONS ON THE PAIRING OF LIMAX MAXIMUS L.

By LIONEL E. ADAMS, B.A.

(With Plate III).

(Read before the Society, December 8, 1897).

During the months of last July and August I devoted considerable time to the observation of the pairing of this species, and as few conchologists seem to be aware of the extraordinary manner in which this takes place, the following account may be of interest.

I may mention that my figures (kindly drawn by my friend, Mr. J. W. Taylor) are all from carefully-measured sketches on the spot, and that, though I have made drawings of a dozen or more examples, in no case did the measurements vary materially.

The size of the organs is remarkable, but is accounted for by the fact of their being congested with the sexual secretions. Dissection of these slugs during the pairing season shows that the *albumen gland* and the *common duct* occupy the greatest part of the interior.

How these slugs find each other I cannot say. It is certainly not by sight, as (so far as my experience goes) pairing is only carried on at night, between 10 p.m. and 2-30 a.m., though perhaps later. Nor do they follow each other by their mucous tracks; yet I have seen an individual make straight for another on the side of a brick wall from the distance of six or seven feet. Most likely the power of scent mentioned in a note of mine in this journal (*vide antea*, p. 24), is the explanation. This nocturnal habit is most fortunate for the preservation of the species, as otherwise their enemies would find them in an exposed and helpless condition.

When the pursuer overtakes the pursued, each touches with its tentacles the tentacles of the other, after the manner of ants. Then begins a circular procession,[1] each with its mouth at the other's tail, and this procession lasts from half an hour to two hours and a half. Careful observation leads me to suppose that during this performance each is eating the external mucus from the other, for a purpose which will presently appear. The circle now grows more contracted, the slugs overlapping and showing evident excitement, the mantles flapping before and behind. Then, suddenly, the slugs intertwine fiercely, and launch themselves into space, heads downwards, but suspended by a thick strand of mucus, for the distance of 15—18 inches. This mucus thread, which they seem to have been collecting for the purpose, is of a yellowish brown colour, and does not seem to mingle with the mucus on their bodies. The fall is generally as rapid as if there were no support, but is gently checked

1 The habit of a preliminary circular procession is not confined to this species, as I have noticed that *Arion ater*, *Agriolimax agrestis*, and *Ag. levis* affect the same peculiarity.

at the finish. On one occasion, however, the fall was very gradual, and during the descent the couple were busily eating more mucus from each other's bodies. The thread appears to come from their mouths, and runs along the centre of the footsole of each, joining into a single thread where their tails intertwine. The upper part of the thread is joined to the circular patch of mucus left on the wall where their previous gyrations have taken place. I have seen a couple suspended in space from a projecting beam in an outhouse, and also from the leaves of a currant bush, and also from the branch of a yew tree, and once from a glass pane of a greenhouse; but a perpendicular wall or tree-trunk is the usual situation.

Directly the descent is accomplished, an organ is protruded from the genital orifice of each. This organ, cylindrical at first, quickly assumes a club-shape of from $1\frac{1}{2}$—$1\frac{3}{4}$ inches in length (Pl. III., fig. 1), but presently a frilled edge appears along one side (fig. 2) as if unrolled, and in a second or two the unrolling is complete, and the organs assume the shape of fig. 3. The organ along the inner curve of the figure is thick and rounded, while the edge of the whole outer curve is thin and sharp. The unrolled organs now commence to intertwine (fig. 4), finally closing round each other so as to form a knot (fig. 5), of which it is easy to count the whorls. The two upper whorls of the knot thus formed now spread out in the form of a mushroom or umbrella, leaving the lower portion of the knot as before (fig. 9). Fig. 7 gives the view of this from above. Sometimes the two outspread whorls do not overlap as in fig. 9, but curve in different directions as shown in fig. 8, and sometimes they are nearly horizontal, but separate as in fig. 6. The colour of the extruded organs is milk white, flecked here and there with dead white. During 5—10 minutes the slugs hang motionless with the tentacles contracted and flabby, while the two upper outspread whorls keep revolving upon one another; and in this extraordinary manner the mutual act is consummated. This ended, the process above described is reversed; the organs unwind, roll up and finally disappear.

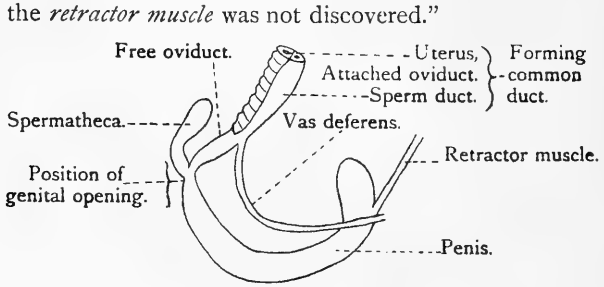
It now usually happens that one slug drops to the ground and lies there for sometimes 15 minutes motionless and apparently exhausted, and finally crawls away; while the other doubles down its head and picks up the supporting thread in its mouth from the centre of its own footsole and climbs up to the point of support, eating the thread as it goes. Frequently the animal will then descend the thread (which usually adheres to the wall) and eat more of it, and on one occasion I saw an individual ascend the thread again and consume all that was left. It often happens that the thread is left untouched and it may be seen for days on the side of a wall or tree trunk. On the occasions when the pair were suspended from the projecting beam neither of

them dropped, as if aware that the distance (6 to 7 feet) was too great for safety, but first one ascended the thread while the other remained stationary, and then the other followed, leaving the thread dangling. After an absence of 10 minutes I found that the thread had disappeared. It certainly had not dropped, so I concluded one or both had returned and eaten it.

What power of sight these creatures possess I cannot say, but the strong light of a bull's-eye lantern flashed suddenly upon them and close to them never causes them to withdraw their tentacles or affect their composure in any way, and this not only when they are in a state of sexual excitement, but when they are roving about solitary or feeding.

Being anxious to determine the identity of the organs extruded, I severed the parts in question from a paired couple and submitted them and the animals to Mr. W. M. Webb, F.L.S., for dissection and to him I am indebted for the following interesting particulars.

"One of the severed structures resolved itself into the half-evaginated *penis*, bearing at its posterior end the *retractor muscle* cut off short and a considerable portion of the *vas deferens*. The second *penis* was completely extruded, showing the peculiar frill on one side of its tube, down the interior of which tube the *vas deferens* was traced, though the *retractor muscle* was not discovered."



Mr. Webb also kindly furnished me with the annexed rough diagram to illustrate his further remarks, which are as follows:

"A glance at the unravelled genitalia brings out the fact that there is practically no *vagina*, the *penis*, *oviduct* and *spermathecal duct* meeting almost at the same point, just within the genital opening. The shortness of the *spermathecal duct* and the position of its opening also point to the filling of the *spermatheca* from the outside of the animal; and one would say that the use of the *penis* is to convey the sperm cells to and not into the female orifice, its frill being developed for the purpose of holding them during the act of passing them over to another individual."

The only detailed description of this interesting method of pairing is in Férussac's scarce work, "Histoire naturelle générale et par-

ticulière des Mollusques Terrestres et Fluviatiles," published in 1819, and this description the author gives at second-hand from M. Werlich. The details tally very fairly with my own observations, but not altogether, and this discrepancy inclines me to think that some other, though closely-allied, species was under observation. Werlich speaks of the extrusion of the organ *before* the suspension of the animals, which I have never seen, nor do I think it likely to happen, for this reason; if the organs were extruded previous to the mutual suspension, they would inevitably become covered with grit and dust, which would seriously interfere with their functions; (the case is very different with *Arion ater*, *Agriolimax agrestis*, &c., which copulate on the ground, and extrude a much smaller organ, and one which is erectile. In the case of these latter, actual penetration takes place, which is not the case with *Limax maximus*). Férussac's figures, too, are quite unlike anything that I have observed, and I fancy he drew them himself from Werlich's description, as I cannot think that Werlich after having witnessed the operation could have drawn figures so much at variance with the reality. He says, "Nous avous fait copier les figures qui accompagnent cette note, Pl. IV. A., de notre Histoire générale, afin de faciliter l'intelligence du récit très intéressant de Mr. Werlich."

It is just possible that the suspension of *L. marginatus* Müller (*L. arborum*, *B. Ch.*) from the branches of trees is for the same purpose as that of *L. maximus*.

Note on Terebra eximia Dh.—On looking through a miscellaneous series of beach-collected marine shells from Borneo, received from the late Rev. W. Turner, I was highly gratified to recognize amongst some other *Terebræ* a good specimen of *T. eximia* Dh. It is 36 mm. in length, and although rather smaller than the one recorded by Mr. J. C. Melvill and myself, in our recent paper on "Madras Mollusca" (*antea* p. 35, Pl. I., fig. 8), it is equally good as regards condition, sculpture, and marking. The discovery of another example of this rare and beautiful species so soon after our Madras record, is extremely interesting, especially as the type specimen, from an unknown locality, was described so long ago as 1859 (*Proc. Zool. Soc.*, 1859, p. 314), and has hitherto remained unique.—R. STANDEN (*Read before the Society*, Feb. 9th, 1898).

Note on a new variety of Testacella maugei Fér.—Through the kindness of Dr. Harmer, I have recently been permitted to examine a collection of slugs in the Museum of Zoology of the University of Cambridge; amongst other interesting forms I notice a perfectly black specimen of *Testacella maugei* Fér. I have previously met with very dark examples of this species, but none have approached the uniform black colour of the Cambridge specimen, particulars of which are given below:—*T. maugei* Fér. var. nov. *nigra*, whole of body, foot-fringe, and foot-sole, a deep black. Loc., Tenby, 1892 (A. H. Cooke), (Mus. Zool. Univ. Camb.).—WALTER E. COLLINGE, F.Z.S., Mason University College, Birmingham (*Read before the Society*, May 11th, 1898).

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"Skrabninger i Vaagsfjorden og Ulvesund, ytre Nordfjord," by JAMES A. GRIEG; ex *Bergens Museums Aarbog*, 1897 no. 16. [List with *Limopsis minutus*, *Scalaria trevelyana*, *Neomenia carinata*; notes on *Tellina ovalis* and the *Scalariæ*].

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The Irish Naturalist, vol. 7, nos. 1–6, Jan. to June, 1898.

"The land mollusca of the Great Skellig," by R. F. SCHARFF [List of 14 spp. including additional note, p. 49]. "An abnormal *Solen siliqua* L.," by G. W. CHASTER. "Land shell 'Pockets' on sand-dunes," by R. WELCH. "*Hyalinia draparnaudi* in N. Ireland," by L. E. ADAMS. "Impressions of Achill; Marine Mollusca," by EMILY M. TATLOW and R. LL. PRAEGER [100 spp., including *Pleurotoma septangularis*]. "*Hydrobia jenkinsi* Smith, in Co. Donegal," and "*Helix limbata* Drap., a Pyreneen shell introduced at Belfast," by R. WELCH.

La Feuille des Jeunes Naturalistes, ser. 3, vol. 28, nos. 327—332, 1898.

"A propos de *l'Helix catocyphia* B.," by PAUL PALLARY [this is merely a local immature form of *H. pisana*]. "Au sujet d'une note de M. Girard sur *l'Helix catocyphia* B.," by P. PALLARY. "Etude des Potamides de l'oligocene de Gaâs (Landes)," by L. VIGNAL [with plate]. "Notice sur les sables infra-inférieurs dits de Chalons-sur-Vesle, aux environs de Reims," by PLATEAU. "Note sur *Involutina conica* n.sp.," by SCHLUMBERGER.

NOTES ON A COLLECTION OF MARINE SHELLS FROM LIVELY ISLAND, FALKLANDS, WITH LIST OF SPECIES.

By J. COSMO MELVILL and R. STANDEN.

(Plate I., figs. 9-13; Plate II.).

(Read before the Society, Feb. 9th, 1898).

Amongst the many recent additions to the collections of Mollusca in the Manchester Museum, a series of marine shells collected by Miss Cobb, at Shallow Bay, Lively Island, Falklands, is of particular interest. A few other species have also been added to Miss Cobb's collection, through the kindness of Mrs. Blake and Prof. D'Arcy Thompson. References to the molluscan fauna of this part of the world are somewhat meagre and scattered, so that the cataloguing of an authentic and characteristic collection like the present is not only an important local record, but also helps towards a better knowledge of the geographical distribution of certain species.

The archipelago of the Falkland Islands (Malvinas), forms a part of the "Magellanic Province" of Woodward,[1] which also includes the coasts of Tierra del Fuego, and the mainland of South America from Port Melo, on the east coast, to Concepcion, on the west. They are situated in Lat. 51° 30° S., and cover a space of 120 by 60 geographical miles, or little more than half the size of Ireland. They are a treeless expanse of moorland and bog, and bare and barren rock, and their wild and rugged shores are washed by tempestuous seas, swarming with mollusca and other forms of marine life, which find ample shelter and sustenance amongst the dense masses of "kelp"—a giant seaweed (*Macrocystis pyrifera*) growing in profusion on every tidal rock, and forming a barrier to the terrible breakers of the western ocean, which no mass of rock not thus protected could long withstand. Woodward assigns 45 species of mollusca to the "province" in general, but gives only the following as being known from the Falklands :—

Scalaria brevis	*Trochita pileolus*
Margarita malvinæ	*Astarte longirostris*
Fissurella radiosa	*Cyamium antarcticum*
Patella barbara	*Modiolarca trapezina*
P. zebrina	*Cardita thouarsii*
P. deaurata	*Venus exalbida*
Scissurella conica	*Lyonsia malvinensis*

He further remarks that "eleven of these have not been met with elsewhere."

1 Manual of Conchology, 1880, p. 82.

Dr. Paul Fischer[1] enumerates 81 species as inhabitants of the "Province magellanique," and to Woodward's list of Falkland shells he adds—*Euthria antarctica*, *Trochus tæniatus*, *Fissurella picta*, *Puncturella conica*, *P. falklandica* and *Modiolarca pusilla*.

The 'Challenger' expedition collected 18 species at the Falklands. Of these, *Calyptræa pileus*, *Photinula cærulescens*, *Trophon liratus*, and possibly two unidentified species of *Calyptræa* and *Lamellaria* included in the list, are not represented in the Cobb collection. The 'Challenger' specimens were mostly obtained from the "kelp" in from 5 to 12 fathoms. Miss Cobb's shells were all collected on the beach, but in the majority of cases are in very good condition, and show but slight signs of sea-wear. To several of the shells of *Mytilus* and *Patella* some most beautiful specimens of *Microporella ciliata*, *Cribrilina labiosa*, *C. monoceros*, *Mucronella tricuspis*, *Cellepora tiara*, *C. punctulata* and other Bryozoa are attached. We are indebted for these identifications to Miss E. M. Pratt, by whom they have been carefully studied, in connection with another collection of zoological specimens received by the Museum from Mrs Blake, of Hill Cove, Falklands.[2] Included in Mrs. Blake's collection are also a number of specimens of *Trophon muriciformis*, *Euthria fuscata*, *Photinula violacea* and *Fissurella mexicana*, with the animals preserved in spirit, together with several Brachiopods, of which two species, viz.:—*Terebratella magellanica* and *T. dorsata*, likewise occur in the Cobb collection.

LIST OF SPECIES.

Siphonaria lessoni Blainv.—Several typical examples. Recorded also from Chili (Paetel).

Lachesis euthrioides sp. n. (Pl. I., fig. 9).

L. testa fusiformi, tenui, læté castaneo-brunnea, anfractibus septem, quorum duobus albatis, apicalibus, cæteris apud suturas impressis, tumidulis, longitudinaliter crassicostulatis, costis ad juncturas costularum spiralium nodulosis, nodulis lævibus, nitidissimis; apertura arcto-rotunda, labro convexo, tenui, canali brevi, curta, margine columellari paullum excavato. Long. 8, *lat.* 3 *mm.*

Fusoid superficially, this little cancellated shell is undoubtedly a *Lachesis*. It is of a bright chestnut brown, somewhat shining, fusiform, seven-whorled, two whorls apical and white, the rest impressed at the sutures, tumid, longitudinally thickly costate, and transversely filo-costulate, shining, noduled at the points of junction. The aperture is ovate-rotund, outer lip thin, canal short, columellar margin slightly excavate. Three specimens.

1 Manuel de Conchyliologie, 1887, p. 172.

2 For list of these forms with notes, see *Manchester Memoirs*, vol. 42, 1898.

The genus *Lachesis* Risso, as restricted, now embraces about thirteen species, inclusive of a new species (*L. bicolor* Melv.) from the Arabian Sea.[1] They are mostly extra-tropical, indeed, the type *L. minima* Montagu is a well known inhabitant of our southern British coasts. Besides this, three are Mediterranean, one Japanese, one from the Island of St. Paul, one (*L. sulcata* Hutton) from New Zealand, and another (*L. meridionalis* E. Sm.) from the Strait of Magellan. This is a curious species, the longitudinal ribs being quite obsolete on the lower half of the body-whorl; while, at the periphery, there is one series of revolving tubercles, and the size is only 4 mm.

Voluta (Cymbiola) ancilla Soland.—One very large dead specimen. Gould gives a capital figure of the animal, but, like Sowerby and Kiener, describes this species as *V. magellanica* (*non* Lm.). It is *V. gracilis* Wood. D'Orbigny records it from Strait of Magellan, and Paetel from coasts of Patagonia.

V. (C.) becki Brod.—Two; one quite juvenile (Pl. I., fig. 11); the other a full-grown specimen, measuring a little over nine inches in length, with, presumably, about an inch of apex missing. It is yellowish chestnut in colour, with longitudinally undulated streaks. In the Philadelphia Academy of Natural Sciences there is a specimen measuring 14 inches in length (Tryon). Hitherto the precise habitat of this large species appears to have been unknown, though generally assigned to Patagonia. Its occurrence in this collection is, therefore, of particular interest.

V. (C.) magellanica Lm.— One small specimen. Patagonia (Paetel).

Euthria antarctica Rv.—Two, quite typical.

E. fuscata Brug. — This species was described originally by Bruguière as a *Buccinum*, and recorded as occurring abundantly on the coast of Peru. In Mrs. Blake's collection there are many examples, in all stages, while in the Cobb collection there are but two, both typical.

E. plumbea Phil.—One rather young example of what appears to be this species, which occurs from Cape Horn to Chili, also Japan. Its synonyms are *Fusus rufus* Homb. & Jacq., *Buccinum magellanicum* Phil., *B. patagonicum* Phil., and, probably, *Euthria ferrea* Rv., and *E. viridula* Dkr.

Trophon albolabratus E. Sm.—One, quite typical, and in good condition. Although Tryon unites this with the very variable *T. geversianus* Pallas, he seems to have been somewhat hasty in his decision, for he admits that he has never seen the species, which Mr.

1 *Manchester Memoirs*, vol. 42, no. 4, p. 14, pl. 1, fig. 17, 1898.

E. A. Smith described from Kerguelen. It is a much more solid shell than *T. geversianus*, and narrower, with fewer and less regular spirals; the suture is not so deeply impressed; the lip is thicker, and the mouth less oblique, whilst the canal is much shorter. Specimens were dredged by the 'Challenger' Expedition in three stations off Royal Sound, Kerguelen, from volcanic mud, in 25 to 60 fathoms (Watson).

T. buccineus Gray.—One specimen, in perfect condition, which exactly matches the excellent figure copied by Tryon. No description or locality is given, but the shell is allied to *T. plumbeus* A. Gd., and is a light chocolate-brown colour, deeper within the aperture.

T. cretaceus Rv.—One rather large example, in the usual worn condition. Recorded from the coast of Chili.

T. geversianus Pall. (Pl. I., fig. 10, Pl. II.).—Six examples of this beautiful species. One is a particularly handsome specimen, snowy white, with well developed broad frill-like lamellæ, and in excellent condition. It indeed so far surpasses in size and beauty the types figured in Reeve's "Conchologia Iconica" and elsewhere, that it has been thought worth while to figure two aspects of this shell. This particular specimen is in J. C. Melvill's collection. Two others almost equal it in size, but are not so perfect in condition. The rest are juvenile. With the collection there is a string of egg-capsules of this species. They are of a yellowish colour, spoon-shaped, closely set together, and in size average 20 × 12 mm. In each capsule there are a quantity of embryos, measuring 2·5 mm. in length; the contents of two capsules were carefully counted and found to contain, respectively, 74 and 112 baby shells. One of these is figured (Pl. I., fig. 10). The species is extremely variable, and occurs from Magellan's Strait to Chili. The synonymy is extensive and includes, amongst others, *Buccinum fimbriatum* Martyn, *Murex magellanicus* Gm., *M. foliatus* Schum., *M. peruvianus* Enc. Méth., *M. lamellosus* Dillw., and *M. patagonicus* D'Orb.

T. laciniatus Martyn.—One, not quite adult, but otherwise very perfect. The absence of the characteristic latticed sculpture in the interstices between the lamellæ readily distinguish this from *T. geversianus*. It is recorded from Magellan's Strait by Tryon, and from the Chonos Archipelago by Reeve. Tryon unites this species and *T. antarcticus* Phil., and expresses some doubt as to whether these South American forms really belong to the genus *Trophon*.

T. muriciformis King.—Five very beautiful and perfect examples. An ovately fusiform, cinereous species, with tumid, cancellated whorls; dark chestnut aperture, and crenulated lip, which amply differentiates it from *T. geversianus*, with which Tryon is

EXPLANATION OF PLATE I.

Fig. 1.—*Cerithium carnaticum* sp. nov. ... ... page 31

„ 2.—*Colina selecta* sp. nov. ... ... „ 31

„ 3.—*Rissoina (Morchiella) thaumasia* sp. nov. ... ... „ 31

„ 4.—*Syrnola maderaspatana* sp. nov. ... ... „ 32

„ 5.—*Turbonilla coromandelica* sp. nov. ... ... „ 32

„ 6.—*Cadulus anguidens* sp. nov. ... ... „ 32

„ 7.—*Sanguinolaria hendersoni* sp. nov. ... ... „ 33

„ 8.—*Terebra (Euterebra) eximia* Dh. ... ... „ 34

„ 9.—*Lachesis euthrioides* sp. nov. ... ... „ 98

„ 10.—*Trophon geversianus* Pall. (juv.) ... ... „ 100

„ 11.—*Voluta (Cymbiola) becki* Brod. (juv.) ... ... „ 99

„ 12.—*Cyamium falklandicum* sp. nov. ... ... „ 104

„ 13, 13a.—*Thracia antarctica* sp. nov. ... ... „ 105

EXPLANATION OF PLATE II.

Trophon geversianus Pall., natural size.

(See page 100).

From a photograph by Mr. Edward Ward. The original specimen is now in the collection of Mr. J. Cosmo Melvill.

EXPLANATION OF PLATE III.

(See page 92).

Fig. 1.—Penis when first extruded.

,, 2.—Penis with frilled edge appearing.

,, 3.—Penis fully expanded.

,, 4.—The expanded organs of a paired couple commencing to intertwine.

,, 5.—Knot formed after intertwining.

,, 6.—The two upper whorls of 'knot' expanding horizontally during copulation.

,, 7.—View of same from above.

,, 8.—The two upper whorls of 'knot' curling different ways during copulation.

,, 9.—Position of pair *in copula*, showing usual appearance of 'knot' where both whorls curl downwards.

All the figures are natural size.

inclined to group it. There are also two specimens in Mrs. Blake's collection. Recorded from Strait of Magellan.

Monoceros calcar Martyn.—One example of this extremely variable shell, of the form with exserted spire to which Lamarck gave the name of *M. imbricatus*. The species occurs from Cape Horn to Chili, where it attains its maximum heaviness of shell. Between this massive form (*M. crassilabrum* Lam.) and the type there ranges a long series of transitional forms, the more marked of which have severally been named *M. striatum* Lm., *M. glabratum* Lm., *M. globulus* Sow., *M. costatum* Sow., *M. citrinum* Sow., and *M. acuminatum* Sow.

Crepidula dilatata Lm.—A good series. One specimen is the form described as *C. pallida* by Broderip; the rest are fairly typical. The type is a large, rugose, inflated form, having the apex much curved to the side of the shell, and the inner margin usually deeply stained, or radiately lineated with chestnut. It has many synonyms, *e.g.*, *C. depressa* Dh., *C. peruviana* Lm., *C. patula* Dh., *C. arenata* Brod., *C. adolphei* Less., *C. grandis* Midd., *C. princeps* Conr., *C. mummaria* A. Gd., etc. It is generally distributed all along the western coast of America, from Patagonia to Alaska, and also Kamchatka.

Calyptrea (Trochita) radians Lm.—Three specimens, all of them identical with *C. corrugata* Rv. Other synonyms are *C. peruviana* Dh., *C. concamerata* Martini, *C. costellaria* Phil., *C. trochiformis* Gm., *C. trochoides* Dillw., *C. araucana* Less., *C. sordida* Brod., and *C. spirata* Forb. It is recorded from Chili and Peru, also from the Island of Inagua, Bahamas (Tryon).

Natica impervia Phil.—Two typical specimens. In this species the callus completely fills the umbilicus. Magellan's Strait (Tryon).

N. magellanica Phil.—Three. Tryon appears to think this may be a form of *N. patagonica* Phil., from Strait of Magellan.

Scalaria (Opalia) magellanica Phil.—Two typical specimens. Also sent by Mrs. Blake.

Photinula expansa Sow.—Three specimens, all of the typical light olive colour, with green and iridescent interior. It also occurs at Kerguelen Island, Strait of Magellan, and South Georgia. The principal synonyms are *Margarita expansa* Sow., *Trochus expansus* Phil., *Photina expansa* A. Ad., *Margarita hilli* Forbes, etc.

P. tæniata Wood.—Several typical examples of this, the largest and most striking species in the small group of *Margarita*-like shells found only in Antarctic America, for which H. & A. Adams instituted the genus *Photinula*. It is imperforate, with a brilliantly nacreous interior, and easily recognizable by the spiral pink bands and lines on a shining white ground. The synonymy is extensive,

and includes *Margarita tæniata* Sow., *Trochus bicolor* Less., *T. lineatus* Phil. (*non* da Costa), *T. hombroni* P. Fisch., *T. purpuratus* Forbes, *Photina cærulea*, A. Ad., etc. It occurs also in Magellan's Strait (Tryon).

P. violacea King.—Seven specimens. A more conical shell than *P. expansa*, with a smaller aperture, and of a purplish-pink colour. Its synonyms are *Margarita persica* A. Gd., *M. violacea* King, *M. magellanica* H. J., *Trochus violaceus* Phil., and probably *Margarita magellanica* A. Gd., but Tryon is inclined to doubt the identity of Gould's species with *P. violacea*. Recorded from Strait of Magellan and Orange Harbour, Tierra del Fuego.

Fissurella darwini Rv.—One dead, but characteristic example of a form which appears to occupy an intermediate position between *F. picta* Gm. and *F. maxima* Sow. It is more conical than the latter, and less elevated than the former, and is sculptured with numerous radiating ribs, which are low and uneven, but scarcely to be called granose. The inside is white, with a blueish-black border. Recorded from Strait of Magellan (Tryon).

F. picta Gm.—Two full grown and typical examples of this handsome shell. Its recorded habitats are Strait of Magellan (D'Avila), Chili and Valparaiso (D'Orbigny).

F. polygona Sow.—Several typical specimens of this most beautiful shell, which is distinguished by its scabrous striæ and chain-like ribs, usually rayed with purple. The inside is white, and the margin spotted. None of the shells in this collection are quite as large as the one figured by Sowerby, and one specimen is without colour, though in the finest possible condition.

F. mexicana Sow.—Four specimens. Tryon considers that the locality given by Sowerby and Reeve ("Real Llejos, Mexico") needs confirmation, and hints that it may be Sowerby's *F. oriens*; but the shells now before us are well distinguished from that species by the finely decussated, close-set radiating grooves, and white-bordered orifice.

Puncturella (Cemoria) falklandica A. Ad.—One typical example. Dall is doubtful whether this is separable from the British *P. noachina*, from which, however, it differs somewhat in its shorter fissure and septum, more distant and equal ribs, and less posterior apex. Recorded from west coast of Patagonia, in 449 faths. (Tryon).

Patella ænea Martyn.—A large and representative series of all the principal varietal types acknowledged by Tryon in (*a*), typical *P. ænea*; (*b*), var. *deaurata* Gm.; (*c*), var. *magellanica* Gm. The type is a very solid shell, elevated, with strong radiating ribs, brownish ash-coloured exteriorly, with a lustrous bronze-tinted interior, and scal-

loped margin. *P. gaudichaudi* Blainv. is a synonym. The var. *deaurata* is chiefly distinguished from the type by the thin, oblong, depressed shell, showing dark-brown radiating stripes interiorly, and the apex curving forward. *Patella cymbularia* Del., *P. ferruginea* Sow., *P. delesserti* Phil., *P. varicosa* Rv., and *Nacella strigatella* Roch. & Mab., are also synonyms. Tryon also considers that *P. polaris* Marts. & Pfr. is merely a form of *P. deaurata*, and that *P. varicosa* Rv. is identical with Woods' & Gmelin's *P. flammea*. Var. *magellanica* Gm. is of a rounder form than typical *P. ænea*, and has a more central, erect, and elevated apex. Variations of this form have been described by Reeve, under the names of *P. atramentosa*, *P. venosa*, and *P. chiloënsis*, whilst Rochbr. & Mab. coin many species from it. Both typical *P. ænea* and the vars. *deaurata* and *magellanica* have hitherto only been recorded from Strait of Magellan.

Acmæa textilis A. Gd.—Six specimens. This species seems to possess good and distinctive specific characteristics, although included by Tryon in the synonymy of *A. persona* Eschz., an excessively variable species, which ranges from Sitka to Turtle Bay, Lower California.

Scurria scurra (Less.).—A very fine example of this has been added to the collection through the kindness of Prof. D'Arcy Thompson. It was collected by Mr. J. Cooper, in 1893, and is of the somewhat depressed terraced form figured by Tryon.[1] The range of this species is given by Tryon as extending from 12° to 41° S. Lat., west coast of South America. Its synonyms are *Patella scurra* Less., *Acmæa scurra* D'Orb., *Lottia pallida* Sow., *Lottia conica* A. Gd., and *Acmæa cymbula* Hupé.

Nacella cymbularia Lm.—Three specimens, of a pale horn colour, with silvery iridescent interior. Tryon restricts *Nacella* to one species: *N. mytilina* Helbl., which lives upon the great seaweeds of the Tierra del Fuego shores, and he includes *N. cymbularia* amongst its numerous synonyms.

Chiton (Plaxiphora) setiger King.—One typical example of this well-known South American species.

Lima falklandica A. Ad.—One perfect specimen, together with odd valves of a very delicate shell with some affinity to *L. loscombi* Sow.

Pecten (Pallium) corneus Sow.—Valves only. The typical form. Recorded from Strait of Magellan.

P. rufiradiatus Rv.—Many valves, distinctively representative of the species. It is recorded from Strait of Magellan by Reeve, and is a characteristic form of the type of *Pecten* peculiar to that locality;

1 Man. Conch., vol. 13, pl. 39, figs. 26-27.

but it differs from the more orbicular *P. patagonicus* King, in the camparatively greater height of the shell, crenulated ribs, and unequal ears.

Mytilus bifurcatus Conr.—A peculiar looking shell, about 25 mm. in length, strongly grooved, triangularly ovate, very gibbous, and of a dark indigo blue-black colour. Reeve does not give any locality, but it is recorded from California by Paetel.

M. magellanicus Chemn.—Three young and two adult examples of this fine pear-shaped shell. It is blue-black in colour, with waved crenated ribs. The larger shells bear beautiful growths of Bryozoa, etc.

M. ungulatus L.—With the exception of size, there seems little to separate this from our *Mytilus edulis*. It seems to run through the same gradations of form, including typical var. *gallo-provincialis* Lm. Recorded from Chili (Cuming). Paetel makes *M. ungulatus* synonymous with *M. latus* Lm. from New Zealand, but this can scarcely be correct.

Modiolarca pusilla A. Gd.—One typical example. Recorded from Kerguelen (Fischer).

M. trapezina Lm.—Nine specimens, in various stages of growth, of a very elegant shell, varying in colour from bright orange to purplish yellow or rich sienna-brown. Recorded from Strait of Magellan (Paetel); Kerguelen and Auckland (Fischer).

Cyamium falklandicum sp. n. (Pl. I., fig. 12).

C. testa mediocri, æquivalvi, inæquilaterali, oblongo-rhomboidali, tenui, albida; valvis sub lente undique concentricé striatis, striis rudibus, posticum apud marginem rugoso-laminatis, umbonibus prominulis, contiguis; valvis dorsaliter posticé leniter declivibus, prolongatis, anticé rotundatis, ligamento corneo, externo, valvam apud rectam dente cardinali magno, bifido, apud sinistram duobus minoribus; superficie interna alba, parum nitente, linea palliali indistincta, paullum sinuosa. Alt. 7, *lat.* 12, *diam.* 4 *mm.*

This interesting addition to a very circumscribed genus has been confused with *C. antarcticum* Phil., by Gwyn Jeffreys.[1] This latter, however, is quite distinct, and correctly-named examples exist in the British Museum, where also is this species without a name. It is smallish in size, equivalve, very inequilateral, rhomboidal, thin, white, the valves concentrically striate, and towards the posterior margin wrinkled-laminate; the ligament is horny and external, the posterior dorsal margin gradually sloping, prolonged, anteriorly rounded, the cardinal tooth in the right valve is large and bifid, in the left there are two smaller teeth; within the surface is

1 Brit. Conch., vol. 2, p. 257.

white, scarcely shining, the pallial line to some extent sinuous, but not very distinct.

Chione (Omphaloclathrum) exalbida Chemn.—Three examples, varying in growth and development. A massive, flat, oblong shell, with raised concentric striæ. Occurs in Straits of Magellan.

Cryptodon falklandica E. Sm.—A shell with some affinity to *Axinus flexuosus* Mont.

Saxicava antarctica Phil.—A stout coarse shell, found burrowing in the roots of the large seaweed. Recorded from coasts of Chili (Paetel).

Thracia antarctica sp. n. (Pl. I., figs. 13, 13a).

T. testa deformi, ferè æquivalvi, sordidè alba, tenui; valvis ambabus concentricè rudistriatis, convexis, utrimque hiulcis, anticè rotundatis, posticè truncatis, brunneo-sordescentibus, rudilamellosis; umbonibus in uno specimine prominulis, incurvis, contiguis, in altero ferè immersis; margine dorsali posticè paullum excavato, anticè leniter declivi, ventrali ferè recto; dente cardinali magno, cochleari; superficie interna alba, paullum prismatica, linea palliali obscura, sinuosa. Lat. 15, *alt.* 11, *diam.* 6 *mm.*

To some extent resembling *T. distorta* Phil. from North Europe, or *T. cuneolus* Rv., this very interesting little form differs from both in decidedly less rotundity of outline; it is, indeed, a far more typical *eu-Thracia*, though to some extent liable to the *Saxicava*-like deformity so often present in our North European *Th. distorta*.

It is of a dirty white, posteriorly stained with brown, and truncate, anteriorly rounded, the umbones contiguous and prominent in one specimen, while in another they are almost immersed; the dorsal margin is posteriorly slightly excavate, anteriorly gently sloping, the ventral margin almost straight. The surface is concentrically rudely striated, the valves convex, almost equal. Interior surface slightly nacreous, whitish, pallial line obscure, sinuous.

Only one *Thracia* (*T. similis* Conr.), of quite a distinct group, has, till now, been reported from South American shores.

Helix nemoralis and H. virgata without food for fourteen months.—In September, 1894, I collected about eighty specimens of *Helix nemoralis* and a somewhat larger number of *H. virgata*. As I had not time to clean them, they were sent home in a cigar box which was inadvertently placed among a number of empty boxes in a cellar, exposed to the cold of winter and the draught from a ventilator looking towards the north. They were re-discovered on Saturday, October 26th, 1895, and it was found that on placing them in tepid water for a few minutes, eight *H. nemoralis* and five *H. virgata* recovered and appeared little the worse for their long fast.—A. HARTLEY (*Read before the Society*, Nov. 6th, 1895).

OBSERVATIONS ON ABNORMAL SPECIMENS OF PLANORBIS SPIRORBIS AND OTHER FRESHWATER SHELLS AT TENBY.

By A. G. STUBBS.

(With Plate IV.)

(Read before the Society, March 9, 1898).

A LARGE series of various abnormal shells was exhibited at the February meeting of the Conchological Society. Since then I have obtained a still larger number from the same place, many of them being truly remarkable. They were collected from a ditch, near the town, which abounds with several species of freshwater mollusca, of which the following is a full list together with some of the chief varieties :—

Planorbis nautileus and var. *crista.*

P. spirorbis and var. *albida* (one specimen), and many monstrosities.

Bullinus hypnorum and var. *major*, and a few monstrosities.

Physa fontinalis, typical form, and monstrosities.

Limnæa peregra, two distinct forms, one abnormal.

L. palustris vars. *elongata* and *albida.*—One fine specimen of the latter variety last year, and two others more recently. Mr. Charles Jefferys, of Tenby, also found another half-grown specimen, on February 16th of this year. Mr. Standen informs me that only two specimens of the albino form of *L. palustris* have previously been recorded :—one, from near Leeds, by Mr. J. W. Taylor[1]; the other from Southport, by Mr. Edward Collier.[2] Monstrosities are frequent.

Valvata cristata, Sphærium corneum, and **Pisidium pusillum** are common.

The following is an account of the principal monstrosities observed:

Planorbis spirorbis.—Of the abnormal examples of this species, a representative series is shown on Plate IV. They are confined to quite a small reach of the ditch (about sixty yards), though the species is very abundant throughout the whole length, and the one hundred specimens shown only represent a portion of those I have taken.

The most interesting forms of distortion noted in *Planorbis spirorbis* are the following:—

1.—Almost the entire shell scalariform, like a pile of draughts placed one on top of the other.

2.—The apical whorls scalariform, the last two or three normal, giving the shell the appearance of a Welshwoman's hat.

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1 *J. Conch.*, vol. 1, p. 29.

2 *Tom. cit.*, p. 139.

3.—The apical whorls normal, the last two or three bent down and coiled underneath the shell in corkscrew fashion.

4.—Shell normal, except the last whorl near the mouth, which is (*a*), produced at right angles to the shell (in the same plane); or (*b*), bent back and lying flat across the shell; or (*c*), bent downwards and coiled right away from the shell.

5.—Shells twisted into an indescribable tangle.

6.—Shells flat, but oval, instead of round, with occasional gaps between the whorls.

7.—Sinistral. Four specimens only have up to the present come into my hands; three of them are particularly fine (see last three figs., Plate IV.); the other is a young one, but I did not like to run the risk of trying to bring it up to maturity, as the scalariform specimens are very fragile. One specimen is a good example of the no. 1 form mentioned above, and shows clearly the keel placed on the upper edge of the whorl; the other is an example of extreme scalarity, the last two or three whorls being entirely disconnected.[1]

By far the commonest form of distortion is for the shell to be normal, with the exception of the last whorl or part of it, which is bent downwards and coiled beneath the shell.

Roughly speaking, I should say that the proportion of distorted specimens to normal ones in the spot where they are most plentiful, is two per cent. One good sweep of the dredge will bring up about forty or fifty specimens of *Planorbis spirorbis*, and there is almost sure to be one monstrosity amongst them; I once took five in one sweep, but this was exceptional.

Bullinus hypnorum.—One specimen has the last whorl curiously malleated (like *Limnæa palustris* var. *lacunosa*) and the top whorls turreted. Another has longitudinal lines of growth of a darker colour on the body-whorl, and is much turreted in the top whorls. A third is much turreted, though the body-whorl is normal.

For comparison with the above three, a specimen of *B. hypnorum* from another ditch in the neighbourhood is sent. It has an elongated spire, with rounded whorls, an abnormally short body-whorl, and a small mouth. The difference in form between this and the turreted specimens is remarkable, and a novice might be forgiven for thinking them different species.

Physa fontinalis.—One specimen with a considerably inflated mouth.

Limnæa palustris.—Several monstrosities in this species have been dredged, the most remarkable being a specimen with a much-expanded mouth, and the lip reflected, as in *L. peregra* var. *labiosa*.

1 Monst. *priscum*, Taylor, Monogr. Brit. L. F. W. Moll., part 2, p. 117.

Some are stunted and turreted, others are elongated and slightly scalariform, while one is beautifully banded with white.

Valvata cristata.—This species is occasionally distorted in the last whorl, which is slightly bent downwards.

Limnæa peregra.—There are two rather small forms of this species living together in the ditch. One, the larger of the two, has a produced spire and is of the normal yellow colour, probably var. *acuminata*; the other is of a deep red colour, occasionally blotched with yellow on the body-whorl. The majority of these have in addition to the abnormal colouring a very pronounced growth-check, about half-way round the body-whorl. The shell is rather solid till it reaches this check, when a much thinner growth takes place, apparently proceeding from the inner-edge of the old growth, as it leaves a ridge on the outside, which juts out prominently at the base of the shell. A possible cause for this change of growth may be the flooding of the ditch into the pastures during the heavy rains of November and December last, when building operations would in all probability be stopped for a time. Then, when the water subsided and building was resumed, the shell-forming ingredients in the ditch may have become so diluted with the flood-water that a thinner growth resulted.

From the patches of yellowish sediment which are to be seen in some parts of the ditch, I imagine the water contains a fair percentage of iron, which might cause the peculiar red colouring of the shells, though why it should not also affect the other form of *L. peregra* is not easily accounted for.

Apart from mollusca, the ditch is also full of newts, sticklebacks, caddis-larvæ, water-beetles, water-spiders, etc., and as might be expected, to balance such a large amount of animal life, it is covered over with various water plants, the chief of which (where the abnormal forms occur) are a broad-bladed grass, *Poa fluitans*, also *Callitriche verna*, and *Ranunculus aquatilis*.

Most of the ditch is dried up in hot weather, and the rest has but a few inches of water left in it. I should think, therefore, that one chief cause of the production of the abnormal *P. spirorbis* is that suggested by Mr. J. W. Taylor,[1] viz.: "That when the water is nearly dried up, the efforts of the creatures in forcing their way through the thick mud in which they are sometimes left partially embedded, to again reach the water, may easily cause an alteration in the direction of a new shell growth, if at the time in course of formation."

1 Monogr. Brit. L. F. W. Moll., part 2, p. 118.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

272nd Meeting, June 8th, 1898.

Mr. Thos. Rogers in the chair.

Donations to the Library announced and thanks voted:

La Feuille des Jeunes Naturalistes, ser. 3, vol. 28, no. 332; The Naturalist, no. 497; Annalen des K. K. Naturhistorischen Hofmuseums, vol. 11, nos. 1—4; Proceedings of the Royal Physical Society, Session 1896—97; Actes de la Société Scientifique du Chili, vol. 4, no 1, 1894; Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 42, part 2, 1898; Irish Naturalist, vol. 7, no. 6; Marine Shells from the Andaman Islands, by J. C. Melvill and E. R. Sykes; Further Investigations into the Molluscan Fauna of the Arabian Sea, Persian Gulf, and Gulf of Oman, with descriptions of forty species, by J. C. Melvill; County and Vice-County Divisions of the British Isles (for biological purposes), by A. Somerville (*from the Authors*).

Donation to the Cabinet announced and thanks voted.

A scalariform specimen of *Valvata cristata* from Barnes from Mr. J. E. Cooper.

Summer Meetings.

It was arranged to discontinue the ordinary meetings during the months of July, August and September and instead thereof to hold a number of half-day excursions, the first to take place on June 18th.

Annual Meeting.

The Annual Meeting will be held at Stafford on a Saturday in October and will take the place of the ordinary meeting for that month. Full particulars will be announced in the October number of the Journal.

Candidate Proposed for Membership.

Mr. A. W. Rymer Roberts.

Report on the Excursion on May 22.

The excursion arranged by the kindness of the President was held on Saturday, May 22. Some half-dozen members met at Froghall Station, a few of whom had spent the previous night at Cheadle, and had greatly enjoyed the opportunity of a walk round Mr. Masefield's grounds and the sight of the nesting-boxes, in which a considerable number of the birds that frequent his garden have been induced to take up their quarters.

In a pond near Froghall were collected:—

Limnæa peregra Müll.,
L. stagnalis L.,
L. glabra Müll.,
L. glabra var. *decollata*.

By the courtesy of Mr. Frazer the party was conveyed by the quarry tramway from Froghall to the top of Caldon Low, where the serious business of the excursion began by a vigorous search under the loose stones lying beside the approaches. Here were obtained:—

Arion circumscriptus Johnst.,
Limax marginatus Müll.,
Agriolimax agrestis L.,
Hyalinia crystallina Müll.,
H. cellaria Müll.,
H. cellaria var. *albina*,
H. pura Ald.,
Helix rotundata Müll.,
H. concinna Jeffr.,
H. rupestris Drap.,
H. nemoralis L. (*rubella* 00300),
H. hispida L.,
H. pulchella Müll.,
H. pulchella var. *costata*,
Cochlicopa lubrica Müll.,
Carychium minimum Müll.

On a broken wall opposite the school-house *Balea perversa* was found in fair quantities as well as :—

Helix concinna Jeffr., | *H. rotundata* Müll.

A pleasant walk over the high ground, broken by a halt at a farm-house for refreshments, led to the Worth Wood, where an examination of the fallen logs and branches and the moss covering the stones yielded :—

Arion ater L.,
A. ater var. *rufa*,
A. circumscriptus Johnst.,
A. hortensis Fér.,
Agriolimax agrestis L.,
Limax maximus L.,
Hyalinia cellaria Müll.,
H. crystallina Müll.,
H. alliaria Miller,
H. radiatula Ald.,
Helix nemoralis L. (*rubella* 00000)
H. arbustorum L.,
H. concinna Jeffr.,
H. fusca and var. *alba*,
Clausilia perversa Pult.,
C. laminata Mont.,
Vitrina pellucida Müll.

Also from a pond near Worth Wood :—

Limnæa glabra Müll., | *L. peregra* Müll.

At Ramsor Quarry, near the southern extremity of the wood, which was next visited, the following species were discovered either under stones or crawling on the face of the cliff :—

Hyalinia nitidula Drap.,
Helix rotundata Müll.,
H. rupestris Drap.,
H. hispida L.,
H. caperata Mont.,
H. nemoralis L.,
H. nemoralis var. *castanea* and var. *libellula*,
Buliminus obscurus Müll.,
B. obscurus var. *albina*,
Pupa cylindracea Da Costa,
Clausilia perversa Pult.

The last locality to be examined was Cotton Dale, just above Oakamoor, where the following were collected mostly among the dried leaves under the beech trees :—

Hyalinia alliaria Miller,
H. fulva Müll.,
H. radiatula Ald.,
Helix rufescens Penn.,
H. aculeata Müll.,
H. lamellata Jeffr.

The arrival at Oakamoor was so timed as to allow of a pleasant re-union round the tea-table, where a comparison of notes on the events of the day formed an agreeable sauce to a substantial meal, after which the party separated with expressions of cordial gratitude to the President for the successful way in which he had organised and carried out the expedition.

Papers Read.

" Observations on *Limnæa peregra*," by A. G. Stubbs.
" Note on *Valvata cristata*," by J. E. Cooper.
" *Paludestrina jenkinsi* Smith in two new Irish localities," by L. E. Adams.
" *Arion ater* v. *rubra* Baud., new to Britain," by L. E. Adams.
" New county records for Ireland," by R. Welch.

Exhibits.

By Mr. Chas. Oldham : A very large specimen of *Limax cinereo-niger* var. *luctuosa* Moq., from Taxal, Cheshire.

By Mr. J. R. Hardy : A remarkable scalariform *Planorbis spirorbis*, kindly lent by the Vernon Park Museum, Stockport, for exhibition at this meeting. It was collected by Mr. James Walkden in one of the famous " twenty pits " at Moss Side, in 1864. These pits have long been filled up and built upon. The shell is of a most unusual trochoid form.

By Mr. Ed. Collier: Three fine examples of *Limnæa palustris* var. *albida*, from Sandwich (E Coll. Miss Hele).

By Mr. R. Standen: A fine series of *Buccinum undatum* type, and varr. *acuminata* and *carinata*, dredged of the Isle of Thanet (E Coll. T. Edwards); *Lacuna divaricata*, *Rissoa parva* var. *interrupta*, fine specimens, and *Modiolaria discors*, all dredged off Port Erin, Isle of Man, by the Rev. Lewis Shackleford.

By Mr. R. Cairns: A set of very fine examples of *Marginella cleryi* Petit, *M. bifasciata* Lm., *M. splendens* Rv., and *M. pseudofaba* Sow., all from Senegal.

By the Secretary: A selection of the mollusca mentioned in the report upon the Society's excursion to Staffordshire, and collected by the members present upon that occasion.

By Mr. R. Welch: A fine collection of Irish specimens illustrating the new "County records" dealt with in his paper, and also many interesting locality sets, comprising *Hyalinia draparnaldi* from near Belfast (diagnosed as really this species from examination of the radula by Mr. W. Moss); *Hy. cellaria* var. *albina*, Cashel Rock, co. Tipperary; *Hy. alliaria* var. *viridula*, Great Skellig, Kerry; *Hy. nitidula*, Kenbane Head, co. Antrim; *Hy. nitidula*—a very thin form of type and var. *helmii*, Dernasliggan, co. Galway; *Hy. radiatula* and var. *viridescenti-alba* from Belvoir Park, co. Down; Kenmare, co. Kerry, and Delphi, co. Mayo; *Hy. fulva*, marsh, near Killough, co. Down; *Hy. crystallina*, Crow Glen, co. Antrim, and Delphi, co. Mayo; *Helix rotundata* var. *alba*, Killough, co. Down; *H. rupestris*, Fore, Westmeath; Knockninny Hill, co. Fermanagh; Annaghdown, co. Galway; Ballygally Head, co. Antrim, and Kenmare, co. Kerry; *H. lamellata*, Mucksna Wood, Kenmare, Kerry; *H. aspersa*, Cashel, Tipperary; *H. nemoralis* vars., Cashel, Valencia Id., co. Kerry (a fine series of thin shells showing much variety of colour and banding: (vars. *albolabiata*, *castanea*, *undulata*, *olivacea*, and *rubella*); a thin pellucid form with broad white sutural band from Falls Road, Belfast; var. *conica*, Killard Point, co. Down; and a set of thin, dwarfed, but richly-coloured forms from dunes, golf links, Newcastle, co. Down; *H. hortensis*, Downpatrick Cathedral yard, co. Down—the only authentic locality in Ulster (except Portsalon) for this species; *H. arbustorum*, Kenbane, co. Antrim; *H. rufescens*, Westport Demesne, co. Mayo; *H. hispida*, Derrykeighan, N. Antrim, Cranfield Point, Lough Neagh; and subscalariform specimen, Glenariff, co. Antrim; *H. fusca*, Portaleen Glen, Tor, co. Antrim, Cave Hill, Belfast; *H. ericetorum* type and vars. *alba* and *hyalozonata*, Rathlin Island, Kenbane; vars. *leucozona*, *lentiginosa*, and abnormal specimens from Portsalon, co. Donegal; *H. caberata* (*intersecta*), Magilligan Point, Portsteward, and Malahide; *H. virgata*, the Saint's Walk, Great Aran I.; *H. pisana* and var. *alba*, Drogheda, Meath Coast; *H. acuta*, Portrush, Portsteward; *H. aculeata*, "pockets," Sand dunes, Portstewart; *H. limbata*—a Pyrenean species, probably introduced with nursery plants—found feeding on roadside, Belmont, co. Down; *Pupa cylindracea*, Ballyrudder, co. Antrim, Dernasliggan, Leenane, co. Galway; var. *curta*, Kenmare, Kilmore, co. Cavan; *P. anglica*, Mucksna Wood, Kenmare; *P. muscorum*, Portsalon, co. Donegal; *Vertigo pygmæa*, Orlock Point, co. Down; banks of River Lagan, Belfast; *V. substriata*, Portstewart, co. Derry; *Clausilia bidentata* (*perversa*), subscalariform, Whitepark Bay, co. Antrim; *Succinea putris*, a small form from Kenmare; *Planorbis albus*, Ballynahinch, co. Down; *P. spirorbis*, Glasmoss and Newcastle, co. Down, Cloonee, Kenmare; *P. carinatus*, Quoyle River, Downpatrick, co. Down; *P. contortus*, Killough, Downpatrick, and Bryansford, co. Down; Glaslough, co. Monaghan; *Physa fontinalis*, Ballynoe and Killough, co. Down; *Paludestrina jenkinsi* and var. *carinata*, Culmore and Bann River, co. Derry; *Hydrobia ventrosa*, Larne Lough; *Limnæa peregra*—small and

very pretty forms from wet rocks on shore at Carnalea, co. Down, from Kenmare, Kerry, and wet mossy cliffs in ravine at head of Glenariff, co. Antrim; *L. auricularia* var. *acuta*, Lough Beg, co. Derry; *L. palustris*, Lough Beg, Toome, Glasmoss, near Comber, co. Down, and a curious small variety from tarn near Killarney; *L. truncatula*—a large pale variety from quarry pools, Magheramorne, co. Antrim; a small form from Ireland's Eye, co. Dublin; and var. *elegans*, Cushendun, co. Antrim; *Ancylus fluviatilis*—a fine thin form from Kinny Lough, Portsalon, and typical examples of var. *gibbosa*, Kenmare, co. Kerry; *Bythinia tentaculata* var. *albida*, Portmore Lake, co. Antrim; *Carychium minimum*, Belvoir Park, Belfast; *Acme lineata* and var. *alba*, Helen's Bay, co. Down; Murlough Bay, and Crow Glen, co. Antrim; and Helen's Bay, co. Down, from the large colony discovered there by Capt. W. J. Farrer.

Observations on Limnæa peregra.—I noticed a curious fact regarding the *L. peregra* in the ditch whence I recently obtained the monstrosities of *Planorbis*, and that is the extraordinary way in which they come out of their shells and creep about without them. Several times when arriving home I have put them with the other species in a basin of water previous to cleaning them, and next morning three or four will have left their shells and be crawling about the sides of the basin quite unconcerned. In this state they live for about a day or a day and a half, then they lie feebly at the bottom of the basin and gradually become covered with a sort of long mildewy growth, which is apparently much relished by the other mollusks as they cluster round the dead *L. peregra*. Sometimes they have come out on the journey home in the bottle of water, and I have several times dredged up the animals without the shells. In the last case I thought the swish of the dredge through the water might have washed them out. I have not noticed this habit in *L. peregra* from other ditches; I believe it is caused by a disease in the animal, and the mildewy growth is a result of it.—ARTHUR G. STUBBS (*Read before the Society*, June 8th, 1898).

Arion ater var. **rubra** Baud. **new to Britain.**—At Shepherdswell, near Canterbury, August 1896, in company with Mr. C. E. Wright, I found two individuals of Baudon's var. *rubra*, which he describes as "beau rouge vermillon." They were among a colony of the more dingy var. *brunnea*, and I think they show simply the extreme limit of brilliance of that form. I noticed that (as with the orange form of *A. subfuscus*) the "paint" came off as I handled them. This striking variety does not seem to have been noticed in Britain hitherto.—LIONEL E. ADAMS (*Read before the Society*, June 8th, 1898).

Clausilia cærulea Fér. **in Hants.**—Mr. C. E. Wright sends me an example of *Clausilia cærulea* Fér. var. *birugosa* Parr, which he informs me was taken with several other individuals of the same species near Petersfield, Hants. Mr. J. W. Taylor, who kindly identified the shell, tells me that this species is a native of the Island of Santorin, in the Grecian Archipelago. It is not clear at present how it became located in Hants. This record does not justify its addition to the British list.—LIONEL E. ADAMS, Stafford, May 1st, 1898 (*Read before the Society*, May 11th, 1898).

NOTES ON THE LAND MOLLUSCA OF GRANGE-OVER-SANDS, LANCASHIRE.

By R. STANDEN.

(Read before the Society, January 12th, 1898).

During August last I paid a short week-end visit, accompanied by Mr. Edward Ward, to the picturesque village of Grange, and devoted most of the time to an investigation of the Molluscan Fauna of the district. The warm wet weather experienced during our stay was peculiarly suitable for shell collecting; and, as the geological formation is mainly limestone, my anticipation that the locality would prove a good one for shells was more than justified by the results. The Windermere road was searched for a short distance, but the most prolific spot found was Eggerslack Wood, which covers the steep hill-side for two or three miles. It is crossed by a zig-zag path, which we entered by a little wicket gate on the roadside opposite to the Grange Hotel. The spaces between the larger trees are filled with a dense undergrowth of sapling timber and hazel bushes, and the ground is thickly covered, in most parts, with a profusion of flat moss-covered stones, dead sticks, and a wealth of creeping plants, matted together and intermixed with decaying leaves—altogether an ideal hunting ground for any naturalist, and especially a conchologist. Here we found an extraordinary abundance of *Hyalinia fulva*, *H. crystallina*, *H. alliaria*, and var. *viridula*, *H. pura*, and var. *nitidosa*, *H. cellaria*, *H. nitidula*, *Helix pulchella* (type only), *H. rotundata*, and var. *turtoni*, *H. aculeata*, *H. hispida*, and var. *concinna*, *H. sericea*, *H. rufescens*, and vars. *rubens* and *alba*; also *Vitrina pellucida* (all dead), and *Cochlicopa lubrica*, together with a few typical *H. aspersa*, *H. nemoralis*, and *H. arbustorum*. High up on the nut-bushes *Buliminus obscurus* occurred sparingly, and the dead sticks and flat stones yielded a few *Carychium minimum*, *Vertigo pygmæa*, *V. substriata*, and *V. pusilla*. The last species I consider a very interesting and important find, as hitherto its only recorded locality in the County Palatine is Silverdale, on the opposite side of the bay, where several specimens were collected by Mr. F. C. Long, of Burnley, in July 1891, and exhibited by me at a meeting of the Manchester Branch in the following November. Mr. J. B. Dixon, of Preston, also took it at Silverdale in June 1894. As in my own case the Silverdale specimens occurred amongst moss, and are rather larger and lighter in colour than those found at Ingleton, and elsewhere in England and Scotland, but they very closely resemble the Irish type of the species which I have collected in Co. Donegal and Co. Antrim. A few *Helix pygmæa* occurred in moss-shakings.

'Sweeping' with a canvas net—ostensibly for Coleoptera—amongst the low-lying ivy, and patches of bracken, was attended with some surprising and entirely unexpected results. Bracken is usually passed by as an unpromising situation for shells, but I found, on dashing the net through the fronds, that they swarmed with *Vertigo edentula*, nearly all of them juvenile, with but three or four whorls to their shells; this species also occurred in considerable numbers amongst the ivy in company with *Helix hispida*, *H. rufescens*, and *H. aculeata*. Various kinds of fungi abounded in the wood, and upon these numbers of *Arion hortensis* and *A. circumscriptus* were observed feeding—a large specimen of the Stinkhorn (*Phallus impudicus*) had had its stem eaten through by these two slugs, causing it to fall over. *Arion ater* was abundant everywhere, but no varieties were noticed. *Limax arborum* was common on rotten tree stumps. It is noteworthy that I did not see a single example of the usually omnipresent *Agriolimax agrestis* anywhere in the district. Most of the low mossy walls throughout the district swarm with *Pupa cylindracea* and *Clausilia perversa*; Mr. Ward obtained some charming photographs of the latter *in situ*, feeding upon the moss and lichen. There is a small colony of *Balea perversa* on a wall on the Windermere road, which, but for the wet causing the animals to leave the shelter of the crannies and come out to feed, we should probably have overlooked. From a patch of *Marchantia*, growing in a characteristic situation, I obtained several specimens of *Acme lineata*, all of typical form: some living, and some dead. After passing through the wood, we followed the mountain path leading to the 'Hospice' until we came to a large expanse of 'limestone pavement,' intersected with innumerable fissures filled with beautiful ferns and creeping plants, and dotted over with heavily fruited juniper bushes. On beating the junipers, many immature specimens of *Helix nemoralis* and *H. rufescens* tumbled into the net, and a careful examination of the fissures immediately below this unlikely habitat resulted in the discovery of many other young shells of both species, together with a few much weathered adult individuals and a quantity of dead shells.

Paludestrina jenkinsi Smith **in two new Irish localities.**—Mr. R. Welch, of Belfast, has sent me some specimens of this species, which he found at Kenmare, in a little stream running into the tidal river at the head of the estuary. They are all uncarinated, and smaller and more slender shells than those from the Thames, some of the adults measuring not more than 3·55 mm. in altitude, while typical specimens measure 5·25 mm. Baltic timber was imported at Kenmare till twenty years ago. Mr. Welch has also sent me specimens of this species taken by himself within half a mile of Newry in marsh drains.—LIONEL E. ADAMS, Stafford. (*Read before the Society*, June 8th, 1898).

ON LATIRUS ARMATUS Ad.

By J. COSMO MELVILL.

(Read before the Society, March 9th, 1898).

Miss Edith C. Wilson has presented a small collection of marine mollusca, gathered by herself in the Canary Isles, to the Manchester Museum, Owens College. The majority of the shells call for no special remark, but amongst them is one dead though perfect and well-developed specimen of *Latirus armatus* Ad., entirely free from any nullipore or other extraneous marine growth, and consequently in a perfect condition, so far as the shell is concerned, for investigation.

It is a great pity we know so little about the animal. The only item of information vouchsafed us, so far as I can find, is that it is of a red colour. That, of course, is a distinctive attribute of all *Latiri* proper, but we cannot help hoping that full anatomical details of this much discussed and variable form may be forthcoming at no distant date. In the meantime the following is the history of *Latirus armatus* Ad. In 1838 Dr. Gray described a form as *Turbinella spinosa*, which is in all probability this species. The name *T. spinosa* Martyn being already in use, reduced Gray's name to a synonym, and in 1854[1] Mr. A. Adams described from the Cumingian cabinets eleven *Latiri*, without figures or information as to size and in exceedingly bald and bare phraseology. Amongst these we find:—"Latirus armatus A. Adams. *L. testa ovato-fusiformi, umbilicata, spira apertura breviore, fulva, epidermide fusca obtecta; anfractibus longitudinaliter plicatis, lira prominenti transversa (muricata ad plicas) in medio anfractuum ornatis, ultima liris minutis instructo; apertura ovali, canali recto, aperto, columella obsolete plicata, plicis quinque, labro intus sulcato, margine crenato.*

Hab.: California (Mus. Cuming).

This is an ovately fusiform shell, with a muricated transverse ridge in the middle of the whorls, which are covered with a brown epidermis."

Ten other *Latiri* were described at the same time.

The one example of the Cumingian collection was in 1866 transferred to the British Museum, and lay neglected and unobserved for some years till in 1873 the Rev. R. Boog Watson received from Madeira an extraordinary shell with large umbilicus and consequent pseudo-distortion of mouth and canal which, acting on advice tendered him by Dr. Gwyn Jeffreys, F.R.S., and Dr. Paul Fischer, he raised to the rank of a new generic type, under the name *Chascax maderensis* Watson.[2] His description is minute to a nicety and exact

1 *Proc. Zool. Soc.*, 1854, p. 314.
2 *Proc. Zool Soc.*, 1873, p. 361.

in every particular. There is only room to transcribe the first opening sentences :—

"*Chascax* gen. nov. Watson. Shell spindle-shaped, strongly umbilicated, longitudinally ribbed and spirally ridged, but without varices. Epidermis horny. Mouth edge angulated. Outer and inner lip quite smooth. Canal long, narrow, and deep, bent a little to the left, but not at all reversed in front. Operculum strong, horny; nucleus terminal, internally strengthened by a broad ridge all along the right margin."

In 1886, the "Report on the Gasteropoda collected by H.M.S. 'Challenger'" was published, and the Rev. R. Boog Watson names as *Latirus armatus* Ad. the single specimen dredged on this expedition at Station 7 P. Lat. 28° 35' N., Long. 16° 5' W., off Teneriffe, on volcanic sand, 10th February, 1873.[1] If we refer to his preliminary paper[2] on the same subject, we find the shell named *Fasciolaria maderensis* n. sp., and referred to the *Turbinella carinifera* auct., non Lm. Mr. Watson also expresses a doubt whether his *Chascax maderensis*, referred to above, may not be a very aberrant variety. These remarks he repeats almost in extenso in the revised account,[3] and I think an examination of the *Chascax* in the British Museum will prove that his doubt was well founded. Indeed the *Chascax maderensis* is to the typical *L. armatus* exactly as the widely umbilicated form of *Latirus undatus* or *L. infundibulum* is to the less developed shells. It is the tendency of typical *Latiri* to form shells with this (no doubt more or less monstrous) characteristic. The umbilicus is deep seated, and in Miss Wilson's specimen, which is intermediate between the abnormal *Chascax* and the moderate scarcely umbilicate *L. armatus* Ad.,[4] the narrowness is remarkable.

The specimen before us is of pale buff colour, decorticated, heavy, seven whorled, upper whorl angulated in the middle, the upper portion sloping to the suture, the lower straight; the median angulation is sharply noduled, the lower whorl sloping from the suture for about one-fifth of its surface, then transversely angulated and conspicuously sharply noduled; below this a median portion runs nearly straight. Longitudinally, once very lightly transversely lirate, followed by two stronger spiral-raised somewhat noduled ribs. Towards the base are two more light spiral costæ, the aperture is ovate, narrowed peculiarly, as if distorted by the umbilical extension, towards the canal; the outer lip is five or six times grooved; columellar plaits almost if not quite obsolete; umbilicus narrow, but pronounced and deep; operculum not present.

1 'Challenger' Gasteropoda, p. 243.
2 *J. Linn. Soc.*, vol. 16, p. 336, 1883.
3 *Op. cit.*, p. 244.
4 Compare 'Challenger' Gasteropoda, pl. 13, fig. 1.

The true *Latirus cariniferus* Lm. from the Pacific is quite distinct. In this the shell slopes away immediately below the very prominent median spiral angulation at the last whorl. Indeed the abundant *L. polygonus* will remind one more of the typical *L. armatus*, but the whole texture being so different, no one could for an instant suppose that they were identical.

California, given by Adams as the habitat of the Cumingian type, must be erroneous. I see no reason for altering the sequence of this species in the catalogue of *Latirus* and *Peristernia*, with *L. distinctus*, *L. cariniferus*, and *L. polygonus* as nearest allies.

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[In this most useful catalogue each specimen is entered under the name given to it by the original describer, subsequent names being added in chronological order, with cross references from each. The work has been done with great care, and there is an index at the end to all specific names].

The Scottish Naturalist, no. 27, July, 1898.

"Records of Scottish land and freshwater mollusca," by WILLIAM EVANS.

The Irish Naturalist, vol. 7, nos. 7-9, July-Sept., 1898.

"Land mollusca of county Tipperary," by R. WELCH. "*Paludestrina jenkinsi* Smith var. *minor* nov. in South Ireland," by L. E. ADAMS.

[The September number is devoted to special reports on work done in various branches of natural history during the Second Triennial Conference and Excursion of the Irish Field Clubs' Union, held at Kenmare, county Kerry, in July last, and is profusely illustrated from photographs by Messrs. R. Welch and J. St. J. Phillips. The "Report on Mollusca," by R. STANDEN (pages 218-226) contains a list of sixty-two land and freshwater species, together with many interesting notes on habitats and distribution of some of them, e.g. *Geomalacus maculosus; Helix lamellata; H. sericea*, a very local shell in Ireland; *H. caperata*, the occurrence of which is interesting, because of its being one of the four *Helices* belonging to the section *Xenophila*, specially quoted by Dr. Scharff in his "Origin of the European Fauna," as not occurring in this particular district of Ireland; *Succinea oblonga*, taken in considerable numbers under seaweed, a singular habitat for this excessively rare species; and *Limnæa involuta*. An account is also given of an expedition to the Cromaglaun, with descriptions of the Crincaum Lake and its remarkable inhabitant, about both of which many erroneous statements have been made. A reprint of Mr. Standen's paper is sent to each member of the Conchological Society, along with the current issue of the Journal].

Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 42, part 2.

"Further investigations into the molluscan fauna of the Arabian Sea, Sea of Oman, and Persian Gulf, with descriptions of thirty-nine species (Addendum: Description of a new *Strombus* from the Mekran coast of Beluchistan), by J. C. MELVILL [many new species described and figured on plates 1 and 2].

The Naturalist, nos. 495-500, April-Sept., 1898.

"Bibliography, Land and Freshwater Mollusca, 1892 and 1893," by W. DENISON ROEBUCK. "Abnormal example of *Limax flavus*," by C. OLDHAM.

"*Limnæa peregra* in Upland Tarns in Furness," by S. L. PETTY.

The Nautilus, vol. 11, nos. 11 and 12, March and April, 1898. Title-page and Index to vol. 11.

"Mollusca comtemporaneous with the Mastodon," by BRYANT WALKER. "Hawaiian *Cyprædæ*" [list of 42 spp.], by D. D. BALDWIN. "New varieties of *Unionidæ*," by B. H. WRIGHT. "Descriptions of new *Pisidia*" [*P. abyssorum*, *P. pauperculum* var. *nylanderi*]," by V. STERKI. "A classified catalogue of American land-shells, with localities, (*continued*)," by H. A. PILSBRY. "Descriptions of new American land-shells" [*Punctum clappi*, *P. californicum*, *Gastrodonta lamellidens*], by H. A. PILSBRY. "A new sub-genus of *Coralliophaga*" [*Oryctomya*], by W. H. DALL. "Notes on some *Pupidæ*," by T. D. A. COCKERELL.

Vol. 12, nos. 1-5, May-Sept., 1898:—

"Notes on some land and freshwater shells from Sumatra, with descriptions of new species" [*Nanina* (*Hemiplecta*) *marangensis*, *Trochomorpha dohertyi*, *Lagocheilus marangensis*, *Omphalotropis* (*Selenomphala*) *dohertyi*, *Leptopoma fultoni*, *Diplommatina liwaensis*, nn. spp., all figured on plate 1]. by T. H. ALDRICH. "On a new species of *Fusus* [*F. roperi*] from California" by W. H. DALL. "New *Unionidæ*," [*U. streodeanus*, West Fla.; *U. cylindricus* var. *strigillata*, Va.], by B. H. WRIGHT. "Note on *Mariaella dussumieri*" [includes *M. beddomei*], by T. D. A. COCKERELL.

"A list of land and freshwater shells of Enganio with descriptions of new species" [*Melania*, *Planispira*, *Macrochlamys*, *Prosopeas*, *Crossopoma* n.sp.], by J. B. HENDERSON, Jr. "Some observations on the genital organs of Unionidæ, with reference to classification," by Dr. V. STERKI. "Description of a new *Helix*" [*H. disparilis* with fig.], by C. F. ANCEY. "Notices of new species and varieties of American land shells" [*Macroceramus texanus*, *M. floridanus*], by H. A. PILSBRY.

"A new Jamaican land shell" [*Ravenia hollandia* fig.], by J. B. HENDERSON, Jr. "Land shells of Gun Cay, Bahamas" [6 spp. *C. fordi*, *C. pillsburyi*, fig.], by H. A. PILSBRY. "A new species of *Ceres* [*C. nelsoni*] from Mexico," by W. H. DALL. "Some observations on the genital organs of Unionidæ, with reference to classification" (*concluded*) [N.spp. should be based on soft parts as well as shells], by Dr. V. STERKI. "A new *Unio*" [*U. villosus* Suwannee, Fla.]. by B. H. WRIGHT.

"The mollusks of the great African lakes." "On a new species of *Myllita* [*M. inæqualis* S. Austr.], by W. H. DALL. "Note on *Ischnochiton oniscus* Krauss and *I. elizabethensis* Pilsbry," by E. R. SYKES [are really distinct spp.]. "Notes on new and little-known Amnicolidæ" [*A. missouriensis*, *A. walkeri* Mich.], by H. A. PILSBRY. "A new species of *Terebra* [*T. texana*] from Texas," by W. H. DALL.

"*Bifidaria ashmuni*, a new species of *Pupidæ*" [New Mexico and Arizona], by V. STERKI. "Notes on a few Chitons" [*Ischnochiton mitsukurii* n.sp., Japan], by H. A. PILSBRY. "List of marine shells collected at Port Gueydon, Kabylia, with description of a new *Cyclostrema*" [*C. dautzenbergianum*], by C. F. ANCEY. "Notes on the genus *Odontostomus*" [six sub-gg., *Moricandia*, *Spixta*, n.n.], by H. A. PILSBRY.

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Vol. 5, no. 49-52, June-Sept., 1898 :—

"Armature of Helicoid land shells," by G. K. GUDE. "*Pisidium nitidum* var. *lateralis*," by C. S. COLES. "*Helix nemoralis* in Ireland," by J. T. CARRINGTON. "The shells of the Isle of Man," by L. E. ADAMS [General remarks on collecting, &c.].

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"Sur les *Cypræa* de la Mediterranée," by T. DE MONTEROSATO [with coloured plate]. "Descriptions d'espèces nouvelles de Mollusques provenant de l'Archipel de la Nouvelle-Calédonie (suite)," by R. P. HERVIER [with plates 7 and 8]. "Quelques remarques sur les coquilles quaternaires récoltées par M. E. Piette dans la grotte du Mas d'Azil (Ariège)," by H. FISCHER.

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Proceedings of the Royal Physical Society, session 1896-97, vol. 13, part 3.

"Notes on the mollusca of the Laminarian Zone at Leith," by J. G. GOODCHILD. "A catalogue of recent *Cephalopoda*. Supplement 1887-96," by W. E. HOYLE.

La Feuille des Jeunes Naturalistes, ser. 3, no. 335, Sept. 1898.

"Mode de nourriture de l' *Helix hortensis*."

Records of the Australian Museum, vol. 3, no. 4, June, 1898.

"New or little-known lower palæozoic gasteropoda in the collection of the Australian Museum," by R. ETHERIDGE. "Description of a new bivalve, *Lima alata*, from Santa Cruz," by C. HEDLEY.

Valvata cristata Müll.—Among a number of specimens from a ditch on Barnes Common there were a few monstrosities. Of these some had the last whorl detached as an example noted in "British Conchology." The most striking variation occurred in one or two specimens which had the spire very much raised, constituting in fact a scalariform monstrosity.—J. E. COOPER, 7th June, 1898 (*Read before the Society*, June 8th, 1898).

ADDITIONS TO "BRITISH CONCHOLOGY."

(Continued from page 74).

By J. T. MARSHALL.

The **Cithna tenella** of Jeffreys was dredged in the Færœ Channel by the 'Lightning' and 'Triton,' and off the Butt of Lewis by the 'Knight Errant.' Some abyssal specimens from the Atlantic are found to be sculptured, similarly to *Aclis walleri* from the same depths. These sculptured *Cithnæ* Jeffreys named var. *costulata*, and included with them *C. margaritifera* Wats., an abyssal Pacific shell which he had previously advised Dr. Watson was new. Jeffreys gives no reason for changing his mind as to the latter, but probably when he compared Watson's shell with *C. tenella* he had not then noticed the sculptured specimens from this particular depth, which were very few; in addition to which he was working against time at the end, and overlooked many things, ultimately leaving the 'Lightning' and 'Porcupine' Reports unfinished. Dr. Watson, in the absence of any explanation from Jeffreys, prefers to leave his species as it stands,[1] though I do not see any grounds for their separation, the Pacific and the Atlantic forms appearing fairly identical with the exception of a slight difference in the contour of the Pacific shell, which is not strange considering the enormous space between the two stations. In any case, Watson's name stands first for the sculptured form. Another character which some of these deep-water *Cithnæ* and *Aclis* have in common is that the last whorl is peculiarly malleated, as is sometimes seen in the freshwater genus *Limnæa*.

Littorina obtusata L.—In some sheltered coves the shells of this species are covered with a conspicuous striated epidermis, approaching that of *Velutina*. In the male the body-whorl is narrower, the aperture smaller and less expanded, and the spire more produced, but flattened at the apex. Adults of both sexes occur of all sizes, from 1·05 to 6 lines in length, although the males are much less numerous. In rare cases the shell is bicoloured, having a yellow spire and brown body-whorl, or *vice-versa*.

Var. **neritiformis** Brown —Occasionally found with the type in many places, but abundant at Weymouth and Portland. Brown's figure is a useless one, but Forbes and Hanley's figures (pl. 84, f. 3, 4) are very good.

Var. **ornata** Jeffr.—Smaller and rounder; spire more produced and pointed; colours equally variable as in the type; not necessarily banded. Guernsey, plentiful; Weymouth, rare. The male typical shell has a produced but flattened apex; in this variety it is produced and pointed.

1 'Challenger' Gasteropoda, p. 580-1, pl. xliii., f. 3.

Var. **fabalis** Turt.—Longer proportionately from apex to base, and not so obliquely oval as the type. Jeffreys believed this to be the young male of the type, forgetting that in that case they should be found everywhere together, whereas it is not so. It is not the young of either male or female, both sexes being represented in this variety, which lives low down the littoral zone at Guernsey, where it is not uncommon in small seaweeds, whereas the type and intermediate forms live higher up on *Fucus serratus*, etc. A common form in some parts of Torbay and at Guernsey is intermediate in size between this and the type; but it is shaped like the latter, lives with it, and breeds with it. It is a problem why two such forms should live together under identical conditions and yet keep their distinctive sizes, one being just half the size of the other.

Var. **compacta** Jeffr.—Sutherlandshire (Baillie)!

Var. **æstuarii** Jeffr.—The spire of this variety is more raised than in any other, and in shape it is more like *L. rudis*; one cannot look at this curious form without a suggestive thought that it may be a hybrid of *L. rudis* and *L. obtusata*. Fossil in the Belfast deposit (Praeger)! twice as large as recent specimens.

Monstrosities are occasionally found, especially on rocky and exposed shores. One is often met with having the body-whorl out of the line of axis of the spire, in consequence of the animal commencing a periodical growth at a lower level. A curious form from Guernsey and the west of Ireland is shaped like *Lacuna pallidula*, being laterally expanded.

The *L. palliata* of Say is unlike any of our British forms, but appears to me no more than a variety of *L. obtusata*. The thinner outer lip and pointed apex are the only permanent characters I can detect in several hundred specimens from various places. With the mouth towards the observer, it has the expanded aperture and thin lip characteristic of *L. rudis* var. *patula*; with the mouth away, it looks like *L. obtusata*. Though the prominence of the spire is as variable as in *L. obtusata*, the apex is never flattened. In a half-grown state it may be taken for *L. rudis* var. *ornata*, as it is then rounder, with a pointed apex.

L. rudis var. **saxatilis** Johnst.—Shape and sculpture almost as variable as in the type. Besides its own true form of a smooth, small, round shell, it embraces a conglomeration of dwarfs of other varieties, such as *jugosa*, *sulcata*, *patula*, &c., all of which live huddled together at high-water mark.

Var. **sulcata** Leach.—Torbay; Tenby. The prevailing character of this variety is coarse and flattened ribs; it is otherwise variable in

size, colour, and shape, though usually oval. There are two distinct forms, one shaped as the type, the other larger and oval. Besides the purple furrows, it occasionally has a dusky broad band round the periphery. It is not always yellow, being sometimes red or brown, and the purple furrows are often absent. Donovan gave it the expressive name of *nigrolineata.*

Var. **patula** Jeffr.—Smaller, more or less finely ribbed. Guernsey; Torbay; Scarborough. The type sometimes has an expanded outer lip resembling this variety, but this is thinner and has a larger aperture.

Var. **globosa** Jeffr.—Jersey and Guernsey. Usually lives on stony causeways. A subscalariform colony occurs at Jersey on some oozy mud flats. It is the var. *rudissima* of Bean, and I consider the name should have been retained.

Var. **tenebrosa** Mont.—A dwarf form is very abundant in Tilbury Marshes, and a still smaller form, not exceeding a line in length, has been taken by Mr. Duprey and myself in sea-weeds at Jersey, very low down. The latter are especially remarkable, as var. *tenebrosa* does not live on the open coast, but usually near the mouths of rivers and near high-water mark. The shell is occasionally shaped as the type, but it is always thinner, with a deeper suture.

Var. **similis** Jeffr.—Channel Islands, Guernsey especially; Exmouth; Torquay.

Var. **lævis** Jeffr.—Guernsey; Weymouth.

Var. **compressa** Jeffr.—Herm Island; Torbay; Tenby. This is like an elongated form of var. *sulcata*, and differs from the unicolored examples of that variety in being longer and narrower.

All the above varieties merge one into the other, and sometimes two or three of them are combined, such as *tenebrosa-patula*, *compressa-jugosa*, *jugosa-similis*, &c. The var. *saxatilis* is especially mixed up with other dwarf varieties.

For such a common species monstrosities are rare, and yet they are liable, living as they do on rocky and stony shores, to numerous accidents. One cause of monstrosities, as I believe, is the overcrowding of fry in the bodies of the parents; but although *L. rudis* has a formidable progeny to carry, they all seem to come forth without any accidents. I have a fine series of "mends" of this species, but have met with very few distortions or monstrosities. An exception, however, must be made in respect to a numerous colony of the var. *tenebrosa*, taken by Mr. Sykes from a piece of brackish water near Weymouth, where the monstrosities greatly exceeded the typical specimens, and were characterised by the whorls being more or less disconnected, and many of them depressed like a *Planorbis.* Several

reversed and several carinated examples occurred with them. I can only account for this colony of malformations by the presence of an animal or plant, most likely the latter, being inimical to the *Littorina*. But whatever the cause, it was also in operation during the remote period of the Crag seas, as similar forms occur in the Red Crag formation, and have been figured by Searles Wood.[1] An analogous case occurs in *L. littorea* monst. *turrita*, one colony of which lives in Loch Carron, and another in a limited area in Belfast Lough.

A peculiar specimen from Jersey resembles *L. littorea*, while one of the latter from Torbay could easily pass for *L. rudis*. *L. zonaria* of Bean is the banded form of the type.

Sowerby's figures (12 and 18) of the type are perfect. Jeffreys' type figure is too coarse and massive, and belongs to the var. *globosa*. Sowerby's figures of var. *tenebrosa* are also very good, but Jeffreys' is an exaggeration of it. And Sowerby's fig. 13 is the var. *sulcata*.

L. littorea L.—Very rare in the Channel and Scilly Islands. I know of only three instances of its occurrence at Guernsey and two at Jersey in many years, and the Rev. R. W. J. Smart records two from Scilly. Dead shells are of frequent occurrence on the shores of Jersey, but they are importations for edible purposes from Plymouth and the French coast.

Monst. **sinistrorsum.**—I believe there have been only four known examples of this monstrosity in Britain, which is remarkable considering the abundance of the species and the enormous quantities collected for the market. The last one, found by a fish salesman, "parted" for 30/-, but as much as £5 has been paid for one.

Another monstrosity occasionally met with has a double aperture. This very curious "sport" probably arises from the *Littorina* becoming wedged in a crevice of rock with its mouth more or less blocked, which would necessitate its forming another aperture. Analogous instances among the Clausiliæ and Helicidæ are much more common.

The young are strongly and sharply sculptured, and have an elongated spire. A correspondent in *Science Gossip* (May 1890) writes:—"Periwinkles thrive remarkably well in my vases. I have had the same individuals for ten years, and they breed freely. They must be long-lived creatures, for they seem to grow very slowly. The young ones are at first quite unlike their parents, and it is three years before they begin to assume anything like the form of a 'winkle.'"

Rissoa Frém.—Notwithstanding the expositions given by Jeffreys[2] regarding the admissibility of certain genera of this group of mollusca, some writers still treat them seriously as generic. It is no doubt

1 Crag Moll., vol. 3, p. 79, pl. v., . 10 a b.
2 British Conchology, vol. 4, pp. 3, 4.

useful, in dealing with large genera, to group them as much as possible into sections, as Dr. Watson and Mr. Edgar Smith have done in the 'Challenger' Reports, and Dr. Jeffreys in the 'Lightning' Report as well as in "British Conchology"; but if the fair meaning of a genus is once over-stepped, there is no finality about it, and every species of *Rissoa*, *Odostomia*, or *Trochus*, on some ground or other, can have a generic name attached to it.

R. striatula Mont.—Scilly (Burkill and J.T.M.); Killala Bay (Miss Warren); Achil Island; Iona.

Var. **varicosa** Marsh.[1]—Occasionally with the type.

Var. **ecarinata** Mtros. (as var. *minor-ecarinata*[2]).—New to Britain. Much smaller; spiral ridges equalised in space and not laminated; labial rib slight or altogether absent. Guernsey; Scilly; Land's End. Rare in Britain. At first sight this does not look like *R. striatula*; it is but one-fourth the size, and in shape is somewhat like *Odostomia dolioliformis*.

R. striatula is a scarce shell everywhere except in the Channel Islands, where it is not uncommon in suitable localities, adhering to stones deeply embedded in the sand, with *R. lactea*, *Adeorbis*, &c. This and the next species have a small operculum for the size of the aperture, and the animal can retire considerably within the shell. A dwarf form is scarce, but is found everywhere with the type.

R. lactea Mich.—Many parts of Jersey, common (Duprey and J.T.M.); Guernsey and Herm, rare. In 1873 I found several specimens in some ballast on the shore at Fowey, in Cornwall; this shell-sand had been brought in a flat-bottomed barge for farm purposes, and, of course, from a short distance, but it may previously have served as ballast from another place. Mr. Alfred Brown has dredged a dead but fresh specimen off the Butt of Lewis, no doubt a "stray," as it is a common ballast shell from Mediterranean ports.

It cannot now be called "our rarest *Rissoa*" by any means; it is still rare at Guernsey and Herm, but when searched for in Jersey it may be found in abundance in suitable spots. In one particular part of that island I have taken a score off one stone, and almost every stone in its neighbourhood yielded specimens. It is very variable in sculpture, some examples having twice as many longitudinals and spirals as others. Sowerby's figure is incomplete, as the conspicuous spiral striæ are omitted.

R. cancellata Da Costa.—Scilly (Smart and others); Eddystone; Torbay; Caldy Island; Milford Haven; Freshwater West; Killala Bay; Birterbury Bay; Iona; the Minch off Barra.

1 *J. Conch.*, vol. 7, p. 251, 1893.
2 Nomenclatura, p. 65.

Gregarious under stones at very low water at Guernsey and Herm, where I have taken from 30 to 60 specimens under each stone in suitable localities; it is confined to very narrow and limited areas, where no other species appear to live with it. This forms one of the staple shells of Guernsey sand, but it is very scarce at Jersey; nor does it appear to be an abundant species anywhere else.

A dwarf form is not uncommon, about one-third the size of type, which is the var. *minor* of Philippi, and probably the male, as it is found everywhere with the type, though in smaller numbers. The var. *hirta* of Monterosato differs from this dwarf in being narrower, which gives the shell a more oval outline, and it has two instead of three riblets on the penultimate whorl. It was probably a specimen of the latter which Jeffreys named var. *paupercula*. The type is one of the most uniform of shells, no difference except that of size being apparent in hundreds of specimens. An example from Guernsey has the tubercle on the pillar-lip abnormally developed.

R. calathus F.H.—Scilly Isles (Burkill and J.T.M); Lismore 6 f., and Lynn of Morven, 40 f. (Knight)! Knapdale Lochs, 11 f.; Kyles of Bute, 20 f.; Eigg Island, 20 f.; Iona, 16 f.; Sound of Sleat, 20—50 f.; Loch Inver, 25 f.; and Loch Boisdale, 30 f. (Somerville and J.T.M.); Torbay; Caldy Island; Freshwater West; Bantry Bay; Connemara; Killala Bay; Oban, 25 f.; Loch Broom, 30 f.; Minch, off Barra, 30 f.; Sutherlandshire.

Although the sculpture is most variable, it is never quite so fine as in *R. reticulata*; nevertheless, I incline to Jeffreys' opinion that it is only a variety of the latter. There is really no dividing line between the two either in shape or sculpture, many specimens of *R. calathus* being quite as oblong as *R. reticulata*, while many of the latter are conical. I have never met with pronounced Hebridean examples, although it occurs with and is quite as abundant as *R. reticulata* throughout the Clyde and Hebrides. The most characteristic specimens come from Plymouth, and the coarsest from Guernsey. *R. calathus* was dredged by the 'Challenger' off Fayal, Azores, in 450 f., but, as Dr. Watson says, "the solitary Challenger specimen is in such bad condition that the identification of it has been very difficult, and in the end not altogether without doubt. The various identifications of the foreign specimens of this shell seem to need careful revision."[1]

It is occasionally pure white, and, as in nearly all the *Rissoæ*, it has its dwarf form, which is one-fourth the bulk of the type. Both are extremely abundant in the shell sand of Herm. An oblong form from the Channel and Scilly Islands, having very coarse sculpture and convex whorls, resembles *R. hispidula* Mtros., and that shell resembles

1 'Challenger' Gasteropoda, p. 592.

R. zetlandica in shape and sculpture, but the outer lip is not expanded. Both the latter species, according to Monterosato, have been confused by writers under the synonym *R. clathrata* Phil., while the oblong form of *R. calathus* is var. *constricta* Mtros.

Another form of *R. calathus*—dwarf, conical, and short spired—from Scilly and Freshwater West, resembles *R. subcalathus* Mtros. from the Canaries; but the apex of the latter is more pointed and the aperture smaller. Mr. G. B. Sowerby says that *R. fenestrata* Krauss, from South Africa, "differs very slightly from *R. calathus*," and that he is "induced to think it a variety."

R. reticulata Mont.—Every part of our coasts, from the Scilly Isles to the Shetlands.

As remarked in treating of *R. calathus*, it cannot be separated from this species either as regards shape or sculpture. If specimens from different localities are examined the variations will be found bewildering. Sometimes the longitudinal, and at other times the spiral sculpture predominates, and sometimes the penultimate is coarser than the last whorl, or *vice-versa* (the four and six spirals mostly depended on by collectors to define the two species being an unreliable test, especially in the dwarf or male); the length of the spire also varies; and as to shape the forms are endless. After an examination of thousands of specimens from many localities and depths, I cannot define a single character that will separate the two as specific. The only safe separation that can be made for the purpose of classification is that where the shell is conical, the penultimate whorl has four spirals, and the longitudinal ribs prevail over the spirals, they may be called *R. calathus*.

I have not found *R. reticulata* in any of the Channel Islands, and it is rare at Scilly; but both districts supply a "missing link" which may be ascribed either to this or to *R. calathus*. It is of the same oblong shape as *R. reticulata*, with the longitudinal ribs partially suppressed, and where the penultimate whorl is finely sculptured, as in that species, the body-whorl has the coarser cancellation of *R. calathus*, but where the penultimate whorl is the coarser, the body-whorl has the finer sculpture of *R reticulata*. Undoubtedly some of these "missing links" may be called by either name.

The colour is sometimes of a uniform brown, and more rarely white. The male or dwarf form is of course equally diffused with the type, and partakes of the same endless variations of shape and sculpture. Many Hebridean examples in collections are really *R. calathus*, the error chiefly arising from northern specimens of the latter being more finely sculptured than those from the south of England. The finest come from Oban and the Shetlands.

Jeffreys' badly-executed figures of the *Rissoæ* are almost useless for reference. The figures of *R. reticulata* in 'British Mollusca' are very good, but that of *R. calathus* is unlike; while Sowerby's uncoloured figures of both forms are perfect in every respect, though nothing but actual specimens can demonstrate the continuity of these two reputed species.

R. cimicoides Forb.—Scilly Islands (Smart and others); Pentland Frith, 30 f.; West Orkneys, 45 f. There is no difficulty in determining this shell from the last, as its conical shape is most uniform, although the sculpture sometimes approximates to the last two species. It is a more solid shell, has a thicker labial rib, a smaller and rounder aperture projecting more outwards, the suture throughout is distinctly channelled, and the spire is longer and more attenuated in proportion to the base, giving it a pinched-up appearance. Although as widely diffused, it is not nearly so common as the last. Sowerby's figure of this is identical with his figure of *R. calathus*; the former should be more conical, and the last whorl larger, as in Jeffreys'.

Var. **minima** Jeffr.—East Shetlands. A corresponding form to this prevails in the last three species, which I regard as only variations of the male shell.

R. jeffreysi Wall.—Scilly Islands, several dozen specimens (Burkill and J.T.M.). Somewhat variable in shape, size, and sculpture. Anyone who interests himself in the records from the Scilly and Shetland Islands must be struck with the close affinity of the mollusca of these two extremes of the British Isles.

R. punctura Mont.—Those from Scilly are much coarser than usual, and must not be mistaken for *R. jeffreysi*, with which this species is found. It is rarely pure white. Specimens from Guernsey exceed a line-and-a-half in length.

Var. **diversa** Jeffr.—Scilly 40 f. (Burkill and J.T.M.); Iona, 20 f.; Sound of Sleat, 40 f.; and Loch Boisdale, 30 f. (Somerville and J.T.M.); Guernsey, 20 f.; Land's End; Connemara; Killala Bay; Loch Inver 25 f.; Sutherlandshire.

A slender elongated variety is not uncommon on some of our coasts, and there is also an abbreviated one. The elongated form is the prevalent one in the Crag formation, and is accurately figured by S. Wood.

The longitudinal striæ in the variety are not "finer" but coarser, and often fewer than the spiral striæ, with rectangular instead of square spaces.

R. subsoluta Arad.—New to Britain.[1] Scilly Islands, 40 f.;

1 *J. Malacol.*, vol. 4, pp. 67-8.

Færoe Channel, 570 f. ('Triton')! Atlantic off Scilly, 539—717 f. ('Porcupine').

R. abyssicola Forb.—18—70f.; rare in a living state. Isle of Man (L.M.B.C.)! Kyles of Bute, 23f.; Loch Linnhe, 24f.; Arran, 29f., and Lynn of Morven, 40 f. (Knight)! Portincross, Ayrshire (Somerville)! off Lochranza, 18—70f.; Rum Island, 33f.; off Lesser Cumbrae, 44f.; Loch Hourn, 20—75f.; Gairloch, 30f.; Minch off Barra, 50f.; and many other parts of the Hebrides (Somerville and J.T.M.).

The longitudinal ribs are much more flexuous in some specimens than in others, and the height of the spire is variable. A form with remarkably short spire and tumid body-whorl occurs in the Minch in 35f.; and a monstrosity from the same district has a second aperture protruding from the original one.

R. zetlandica Mont.—Scilly, 40f. (Burkill and J.T.M.); Freshwater West; Connemara; Killala Bay; Cumbrae, 20f.; Dornoch Frith; Thurso; Atlantic off Scilly, 690f. (Porcupine).

Scarce in a living state. This and the next species are the most uniform of all the *Rissoæ*, rarely varying in the slightest degree except in size. I have a dwarf form from Scilly, the Minch, and the Shetlands. A monstrosity from Scilly has a double aperture, similar to the one of *R. abyssicola* previously noticed. Jeffreys' figure makes this as coarse a shell as *R. cancellata*, and Sowerby's as still coarser, but the sculpture is in reality finer.

R. costata A. Ad.—Under stones at low water mark in the Channel Islands, and in gravelly sand at low water in Torbay, are the only two records I have for the living shell; but dead shells are dredged in many places and at all depths—Iona, 20f.; Oban, 25f.; Loch Inver 25f.; and Loch Linnhe, 40f. (Somerville and J.T.M.); Dornoch Frith; Barra.

The dwarf is uncommon, from Guernsey, Scilly, and Bantry, and is the var. *minor* of Monterosato.

R. parva Da Costa.—Both type and var. *interrupta* are occasionally milk white. Another form is of the darkest purple, with a white labial rib. Perfectly black specimens are sometimes found in dredgings and shore gatherings, but these have either been voided by coal-fish or embedded in black mud. Exceptional specimens of both forms attain 0·25 inch in length. My largest are from Borough Island, South Devon, both type and var. *interrupta*, and exceed those from the Shetlands, the next largest. A peculiarity of these Borough Island specimens is that a large proportion of them have a prominent

[*To be continued*].

varicose rib on the penultimate whorl, which distorts the last whorl and the aperture out of its normal axis, similar to *R. striata* var. *distorta;* they are two lines in length. A very thin and smooth variety, with convex whorls, and having no colouring nor labial rib, occurs in some rock-pools at Torbay, Saltcoats, Scarborough, and Lerwick, narrow specimens of which are like a large var. *exilis*. Another remarkable one is as broad as long, with a very short spire. And there is an oval form, with a shallow suture, which is not uncommon. The interstitial striæ varies in degree, but are often observable with an ordinary lens.

Var. **semicostata** Mont.—In this variety the longitudinal ribs are evanescent or absent from the last whorl as well as from the three upper ones. Captain Brown[1] appears to have described it under a misapprehension; his description and figures are those of the type, while his alleged figures of the type (f. 55, 56) are impossible. In the latter the longitudinal ribs usually end abruptly a little below the periphery, being cut off by one or more faint spiral lines, but none of the many forms of *R. parva* have the ribs prolonged to the base, as figured by him for the type.

Var. **exilis** Jeffr.—Scilly (Burkill and J.T.M.); Falmouth; Borough Island; Torbay; Killala Bay; Dornoch Frith. This variety is rare. The whorls are convex, and it differs in that respect from a dwarf of the var. *interrupta*, which is still smaller.

The monstrosities are numerous. Among the most remarkable are some from Scilly of a cylindrical shape, like a *Cerithium*, with others of the var. *interrupta*, shaped like young *Odostomia scillæ*; others have a very extended aperture; and one is a beautiful scalariform example of the var. *interrupta*. My monstrosities of this species number several hundreds, some of which are very curious.

R. inconspicua var. **ventrosa** Jeffr.—Torbay; Loch Boisdale and other parts of the Hebrides. Umbilicus more conspicuous.

Var. **variegata** v. Mohr.—In weeds at low water. Most abundant at Torbay and Cumbrae. The apex in this variety is less acute, and the shell varies in shape from conical to oblong.

Of *R. inconspicua* there are three principal forms:—(1), the typical one, having longitudinal ribs and fine cross striæ, figured well by Jeffreys; this is mostly found on the south coasts; (2), finely cancellated with uniform longitudinal and spiral striæ, most frequent in the Hebrides; and (3), smooth, thin, coloured with short streaks of reddish-brown, spire more slender, aperture wider, and having no labial rib, but sometimes one or two of the top whorls are finely

1 Recent Conch., p. 11, pl. 9, f. 1, 2.

ribbed; very abundant at Guernsey and Scilly, and occasionally met with in other places. The latter form is well figured by Sars as *R. inconspicua* var.; it is also well figured in Sowerby's "Index" as *R. inconspicua* var. *maculata* Brown; but Brown's shell is sculptured, has a labial rib, and answers to the second form according to his description; his figures are no guide. "British Mollusca" gives five figures to represent the species, all good ones.

Jeffreys has observed in the 'Lightning' Report that "the sculpture is excessively variable, as regards not only the number and comparative strength of the longitudinal and spiral striæ, but even of their existence." Many specimens are conical, having a shorter spire and broader base.

R. albella Lov.—Jersey; Guernsey; Torbay; Exmouth; Tenby; Milford Haven; Bantry Bay; Connemara; Killala Bay; Iona; Oban; Loch Linnhe; Thurso; Barra.

Var. **sarsi** Lov.—Jersey; Torquay; Exmouth; Skye; Barra. Narrower.

Common in all the estuarine deposits of north-east Ireland, both type and var. *sarsi* (Praeger)!

Jeffreys is not so clear as usual in defining the characters of *R. albella* and its var. *sarsi*. He says the type has "usually a few minute spirals," but "sometimes also longitudinal ribs," while he figures it (as do Forbes and Hanley) as a ribbed shell. He then states that "the labial rib rarely occurs on smooth specimens," whereas the majority of specimens of the type are smooth and invariably have a labial rib. In the 'Lightning' Report he complicates matters by saying that "the principal difference between *R. albella* and *R. sarsi* consists in the latter having more convex whorls and consequently a deeper suture"; but it is the type that is the tumid form and has the deeper suture, as may be seen on reference to his figures. Finally, he gives the habitat as "Bantry Bay at low water," implying that that is its only British habitat; but it is pretty widely diffused, as my records above will show, and is rather common in some places, the majority, however, being ribless, though always having the labial rib. I think Dr. Jeffreys could not have been so well acquainted with this species as he undoubtedly was with the other members of this genus.

Next to *R. parva*, it is the most variable of all the *Rissoæ*, and most collectors have found some difficulty in separating it from *R. inconspicua*. Some specimens certainly run close to *R. inconspicua*, especially a small form of it which has the same length and breadth; but the latter is always more conical, with a longer spire and sharper apex. It is emphatically a species not to be pronounced upon off-hand, and it is, moreover, one essentially requiring the critical faculty and

some study, with a liberal supply of specimens. Only an intimate acquaintance with its many forms, which few collectors have the patience to go through, can give an idea of their variability.

The ribbed shell is the prevalent form at Bantry, where it lives in sea-weeds at low water, and may also be dredged just outside Glengariff Harbour, but from other localities the smooth shells prevail. There are two sizes almost everywhere, but at Connemara they are all dwarfs, showing that this cannot be the male, as surmised by Jeffreys. The bulk of these latter are smooth, and might easily be taken for *R. inconspicua* var. *variegata*, but the whorls are not flattened nor the base angulated as in that variety. Most of the specimens from Torbay are narrower than the type, running even to an oblong shape, and these differ from var. *sarsi* in being more solid and having a labial rib. At Barra, in the Outer Hebrides, *R. albella* is very abundant and varied in form.

No British specimens are as tumid as those from the Baltic, which are the most perfect and typical of the species. Specimens may be found of every degree of length and breadth, every degree of sculpture, size, convexity, suture, and markings. The colouring is usually obscure both in the type and variety, but when visible on the smooth shells the markings appear as short reddish-brown streaks, straight on the upper whorls and flexuous on the last two, though in some rare cases they have broad and continuous longitudinal streaks throughout. A dwarf from Torbay is of the same size and resembles *R. inconspicua* var. *variegata*, but the former has convex whorls and an umbilical chink, otherwise I have never seen a connecting link between the two species, though *R. albella* approximates to *R. parva* in several forms. A broad and tumid form of *R. parva* var. *interrupta* is marked off from the smooth shells of this by the thick bevelled aperture and coloured streak outside, and the same characters separate the var. *semicostata* from half-ribbed *R. albella*. A narrow form with compressed whorls and shallow suture, from Jersey, is shaped as *R. parva* var. *interrupta*, but the markings are different.

I have dwelt thus largely on this particular species because I know of no other member of the genus that gives such trouble to collectors.

The var. *sarsi* is usually narrower than the type, as in Jeffreys' figure, and is occasionally ribbed on one or two of the upper whorls, with more often a varicose rib on one of the middle ones. The markings are as in the type, but more distinct, though many are colourless. Sowerby figures a semi-ribbed shell as the type, a variation which does not often occur, and it is minus the labial rib; he does not figure the variety. It is the *R. similis* of Brown according to his description,

but not according to his figures. The figures in "British Mollusca" are very good.

R. membranacea var. **minor** Jeffr.—Jersey; Guernsey; Penzance; Torbay; Killala; raised beach at Shewalton, Ayrshire (Scott)!

Var. **venusta** Phil.—Near Weymouth. The aperture in this variety is smaller. It is figured in "British Mollusca," but not well.

Typical specimens from Bantry are remarkably stumpy and solid, while those from Jersey are characterised by slenderness and elegance. Plenty of typical specimens are smooth, and plenty of the var. *elata* are ribbed, while the range in size is very great. The var. *minor* is $1\frac{1}{2}$ to 2 lines in length, but some very dwarfed specimens of the type from Guernsey are of the size and shape of *R. costata*. Some monstrosities of the var. *elata* from Portland have the base of each whorl keeled.

R. violacea Desm.—Jersey; Bantry Bay; Birterbuy Bay; Killala Bay; Bundoran.

Var. **ecostata** Jeffr.—Borough Island, S. Devon, one specimen only of the male shell; Bantry and Killala Bays.

In a miscellaneous assortment of the shells of this species they appear to be all sizes, in consequence of the large males being equal in size to the small females; but specimens from the same locality have the sexes always sharply defined by a great difference in size, the males being less than half the size of the females, and much less numerous.

R. costulata Ald.—There has been much confusion on the part of writers in the identity of this species and several allied forms. Monterosato considers *R. guerini* Récl. to be *R. costulata* Ald., while von Mohrenstern considers it a distinct species. Dr. Watson is of opinion that "the whole group absolutely requires revision, and nothing but worse confusion can result from mere partial meddling with it." He further considers *R. costulata* and *R. similis*, as well as "a great many other species, British and foreign, to be mere varieties of *R. parva*." But I believe this to be going a little too far as regards our British species, which I consider to be well defined as species according to the fair interpretation of the term. I have some British variations of *R. costulata* that are *shaped* as *R. parva*, *R. membranacea*, and *R. violacea*, but they all retain the other characteristics of *R. costulata* Ald.; and although I have collected many examples from many places in Britain, I have never met with a doubtful form or a connecting link between any of these species.

R. striata A. Ad.—This lives under stones among shelly gravel at low water, and is dredged dead at all depths. The longitudinal ribs are of a variable character, but are always present.

Var. **distorta** Marsh. (*J. Conch.*, vol. 7, p. 251).—Found everywhere with the type.

Var. **candida** (*Pyramis candidus* Brown, Recent Conch., p. 14, pl. ix., fig. 31).—Usually thinner and more slender; longitudinal ribs obscure or wanting; without varices or coloured bands. This lives in sea-weeds and corallines at low water, and is the form attributed by Jeffreys, erroneously, to var. *arctica* Lovén, but that is a synonym of the next. The longitudinal ribs are noticeable only on the upper part of the whorls, and the difference from the type in that respect is only of degree; but it never has the brown bands round the periphery, and is never variced. The name may still be met with in old collections. A very small dwarf of this, dredged off Guernsey, is a little exquisite, and suggests *R. contorta* Jeffr.

Var. **aculeus** A. Gd.—Resembling the last in being without varices, coloured bands, or longitudinal ribs, but having extremely fine spiral striæ, which are not always observable in dead specimens. Its shape is that of the type, which is usually broader throughout than the var. *candida*. It forms a connecting link with *R. proxima*, and could easily be mistaken for that species. The Rev. Frank Knight has dredged it at Lismore and Loch Linnhe, Mr. A. Somerville in the Sound of Sleat off Glenelg, and I have specimens from the 'Valorous' dredgings in the Arctic seas. It also occurs sparingly in the pleistocene beds of north-east Ireland (Praeger)!

This is the N. American and Arctic form, which is well figured in Sars' work under the generic title *Cingula aculeus* A. Gd. (1841), and is the same form described by Möller as *R. saxatilis* (1842), and by Loven as *R. arctica* (1846). A few are apparently smooth, and require a high power to detect the fine spiral lines. It is wonderfully like Jeffreys' *R. affinis* (i.e., allied to *R. striata*), a very rare species dredged in the 'Porcupine' Expedition; but the latter has additional equally fine longitudinal striæ, which the artist has depicted in his figure, but which the author omits to mention in his description; indeed he expressly says it has "no trace of longitudinal striæ," but in this he was mistaken. Subsequently he must have become acquainted with this northern form, for he wrote in the 'Lightning' Report—"This variety (*arctica* Lov.), as well as a specimen from Corsica, are more or less smooth, and sometimes destitute of the spiral striæ."

R. proxima Ald.—6 to 90 fathoms in muddy sand. Scilly (Smart and others); Teignmouth (Burkill)! Machrie Bay, Arran, 29 f. (Knight)! Killala Bay (Miss Warren)! Antrim (Chaster); from stomach of grey mullet from Norfolk coast (Norwich Museum); Lamlash, 12—15 f.; Brodick Bay, 40 f.; Knapdale Locks, 11 f.;

Sound of Sleat, 60—90 f. (dwarf); Loch Boisdale, 25 f.; and Barra, 40—53 f. (Somerville and J.T.M.); Eddystone; Southport; Skegness; Connemara; Portmarnock; Vidlin Voe, Shetland, 18 f.

Rare everywhere except in Torbay and Babbacombe Bay, whence specimens are occasionally dredged nearly two lines in length. This and the next cannot be the male and female of one species, as in that case the two would always be found together, which is not my experience. Both forms keep very true, and there are no intermedate links between them. Sowerby's figure exhibits longitudinal striæ, which is incorrect; the shell has no trace of them.

R. vitrea Mont.—In similar localities and depths as the last species, but affecting more muddy ground. Scilly Isles, 20—40 f. (Smart and others); from stomach of grey mullet from Norfolk coast (Norwich Museum); Barra, 30 f. (Somerville and J.T.M.); Guernsey, 20 f.; Lancashire coast; Stornoway.

The suture of the last whorl is remarkably deep, with a tendency to become disconnected in aged specimens. Others have a longer and more slender spire, and there is a dwarf form, but it is scarce. Living shells are generally coated with a black and persistent muddy deposit, sometimes no part of the shell being visible. It is scarce everywhere in Britain except at Bantry Bay and on the Lancashire coast. Fossil in the Belfast deposit, fine specimens two lines in length (Praeger)!

R. pulcherrima Jeffr.—This shell varies in length of spire and breadth of base, also in the colouring, which is generally obscure and sometimes altogether wanting; the latter is var. *concolor* Bq. It is often encrusted with *Melobesia*, and aged specimens have a conspicuous umbilicus. Instead of being "very beautiful," as its name implies, it is a most insignificant shell in every way; the colouring is best seen on dead opaque examples, but it is never conspicuous, and many specimens require a high power to see the spotted markings even when present. Sowerby figures the type form well, but Jeffreys' is a more slender form, which occurs in the proportion of twenty per cent.

Var. **pellucida** Marsh. (*J. Conch.*, vol. 7, p. 252).—Guernsey, Sark, and Herm.

R. fulgida Ad.—Scilly Isles, living in weeds and dredged dead (Burkill and J.T.M.)

Var. **pallida** Jeffr.—Jersey and Guernsey; Torbay.

This mite of a shell is solid for its size, and the ground colour is light to dark reddish brown, with two darker bands on the body-whorl, two on the penultimate (one just below the suture and the other at the junction of the body-whorl), and one band on the next, in the

centre; rarely the shell is of a uniform reddish brown. Jeffreys' figure shows one band on the penultimate whorl, but he does not mention it in his description. Sowerby's has two bands on the penultimate whorl and one on the next, which is right; but the bands on these upper whorls can only be seen on clean and transparent specimens; they are never so vivid as on the last whorl, and the dried remains of the animal prevents their appearing well defined. Jeffreys[1] has recorded a var. *efasciata*, found by Mr. Webster in South Devon. This is of a uniform reddish brown, and occurs very sparingly.

R. obtusa Cantr.—It is now generally conceded that our species is not the one which was described by Philippi as *R. soluta*, though Jeffreys prefers to retain the latter name for it on the ground that Cantraine described the aperture of his *R. obtusa* as "obliqua," and the peristome as "continuo," neither of which characters are applicable to our shell; but it is not easy to assign those characters to any other species in this section. Strangely enough, too, neither of the above authors "noticed the spiral striæ nor the umbilical chink," although "Philippi illustrated his description by a figure." The true *R. soluta* Phil. is well figured by S. Wood in "Crag Mollusca" as *R. obtusa*, with doubts as to whether it is the same as the recent British species; while Forbes and Hanley, who figure *R. obtusa* excellently, also express themselves in doubt as to its being the Mediterranean species. *R. soluta* Phil. is very closely allied to *R. intorta* Mtros., if it is not the same thing.

Scilly and Channel Islands; Falmouth; Eddystone; Torbay; Isle of Man and Lancashire coast; Doggerbank; Bantry Bay; Connemara; Mayo; Sligo; Portrush; Dornoch Frith; West Orkneys.

A gregarious species, and variable in size, some specimens being four times the bulk of others. The smallest come from the Eddystone, and the largest from Guernsey and the Minch. Some specimens are oblong, while others at the extreme scale are nearly globular, having the same outlines as *R. triangularis* Wats.

R. semistriata Mont.—Scilly Islands (Smart and others); Dornoch Frith.

Var. **pura** Jeffr.—Not uncommon in the Channel and Scilly Islands.

There are three forms of this species, mostly found together. The first is 0·15 inch long by half that width; this I consider the type, and it is the one figured by Sowerby. The next is smaller and more slender, and may be the male; it agrees with the figure and dimensions given by Jeffreys. The third is a dwarf, about half the size of the preceding.

1 *Ann. Mag. N. H.*, (3), vol. 4, p. 196, 1859.

R. cingillus Mont.—"Atlantic and N. Atlantic. Recorded from the Mediterranean by various writers, but the locality has not been verified, and is probably erroneous; Gibraltar is the only part of the Mediterranean well ascertained."[1] A specimen from Guernsey has convex whorls.

R. pella L. would have a prior claim to *R. cingillus* Mont. if there were not a doubt as to its Icelandic origin, whence it was first recorded by one of Linné's pupils. Adams' *Turbo trifasciatus* has the next prior claim, but has not hitherto been used by writers for some reason.

I have a fine and fresh but dead specimen of *R. cimex* from the Kyles of Bute, 18 f. It may have come in ballast from the Mediterranean, where it is not uncommon. It comes next to *R. cancellata*, and differs from that shell in being larger, oval, and more solid, with finer sculpture, a shallower suture, and more expanded aperture. It has previously been recorded from the Isle of Jura by Laskey, and from Cumbrae by Mr. J. Smith.

Hydrobia Hartm.—Mr. Edgar Smith[2] advocates the substitution of *Paludestrina* D'Orb. for *Hydrobia*, on the ground of the latter being occupied for the Coleoptera (*Hydrobius*); but although this has long been known, it does not seem to have commended itself to writers.

H. ulvæ Penn. — Jeffreys has not described this species with his usual clearness. In the first place, the shell cannot by any means be called "oblong;" it is a lengthened cone, as his figure shows, though usually a little more conical still. Neither is it "more or less distinctly keeled"; plenty of specimens have no keel. Sowerby's figs. 3 and 3* (pl. xiii.) are the more prevalent forms; Jeffreys' is too slender, elongated, and compressed. Nor can the umbilicus properly be called such; it is at most a small chink, often covered by the inner lip; in convex specimens, however, it is more noticeable. The type figures in "British Mollusca" are perfect, and have no trace of an umbilicus, but two figures of varieties have a chink. Besides inhabiting "our tidal rivers, inlets, and bays," Jeffreys has added in the 'Lightning' Report, "everywhere between tide-marks."

It is not easy to say what was Montagu's var. *subumbilicata*. Collectors have come to consider it as smaller, with more convex whorls and a decided umbilical chink, such as Sowerby's fig. 3 (pl. xiii.). Forbes and Hanley say his description is "inadequate," while Jeffreys says it is probably the male, and that their shells have no keel. It cannot be the male form, as small and large specimens are not found

1 Monterosato, Nomenclatura, p. 67.
2 *J. Conch.*, vol. 6, p. 336, 1891.

everywhere together, as they would be if the two sizes indicated the sexes, but specimens of all sizes, from the dwarf of half-a-line to comparative giants a third-of-an-inch, are indifferently keeled or rounded at the base. The authors of "British Mollusca" say[1]—"The var. *stagnalis* of Brown, which is usually termed *subumbilicata* by collectors, but which does not agree with Montagu's description of that species, is smaller and shorter than the type, more convex in whorls, basal inclination and general outline . . . . Professor Brown sent us similar shells as *Paludina stagnalis* Menke." Brown's figures of *Turbo stagnalis* will do for anything, and Searles Wood's description and figures (as *Paludestrina subumbilicata*) apply to *H. ventrosa*, though he says it comes between that species and *H. ulvæ*.[2]

Var. **albida** Jeffr.—Skegness, fine and not uncommon.

Var. **barleei** Jeffr.—Torbay; Skegness; Glengariff. Also Færœ Channel, 570 f. ('Triton')! Bay of Biscay, 1,062 f. ('Travailleur' Expedition). Fossil in the Belfast deposit (Praeger)! This shows some considerable variation, and I have half-a-dozen different forms of it. It is well figured by Jeffreys and Sowerby. It is curious to note that this variety, although living in the littoral zone, is constantly turning up in the dredge from various depths. Sea-birds would suggest the source were it not that the type form swarms in estuaries and constantly serves as food for birds, but is not found on the ocean-bed like this variety. An analogous case occurs in *Lepton clarkiæ*, which is never taken alive except from sea-weeds in rock-pools, yet has often been dredged at various depths, in one case in 690 fathoms in the Atlantic, 150 miles off the Scillies.

Var. **octona** L.—More slender throughout, with a narrow base. Bundoran, and dredged in Donegal Bay by the 'Porcupine.' This peculiar variety occurs in the same pond at Guernsey with *H. ventrosa* var. *elongata*, and closely resembles it; in fact, some specimens can be assigned to either variety, and I am inclined to consider both forms a hybrid between *H. ulvæ* and *H. ventrosa*. I have often visited their habitat, which is a natural lake on a small private estate adjoining the sea-shore, having a natural spring in the centre, and into which the sea flows and ebbs at every tide. It abounds in mullet and other sea fish, with a few marine mollusca, and is a more marine environment than is usually occupied by *H. ventrosa*.

Var. **minor** Marsh. (*J. Conch.*, vol. 7, p. 252).—In many places on the open sea-coast, under stones between tides. This is the shell mentioned in "British Mollusca" as "a small variety taken in Torbay narrower than usual," etc. There are quite half-a-dozen forms of it.

1 Vol. 3, p. 141.
2 Crag Moll., vol. 1, p. 108, pl. xi., f. 2a, b.

According to Sars' description and figure, *H. minuta* Totten seems to differ from this only in having convex whorls.

Var. **tumida** Marsh. (*J. Conch.*, vol. 7, p. 252).—Skegness; Southport; Aberdeen; W. Sutherlandshire.

Var. **decollata** Marsh. (*ibid*).—West coasts of Ireland and Scotland, and a few other places.

Barleeia rubra Mont.—Scilly Isles; Achill Island; Mayo and Sligo; Freshwater West.

The Pembrokeshire coast is the most northern locality I can vouch for for this species; all the more northern records are doubtful. Jersey specimens are more conical, with an obtusely angulated base, and occasionally this form is found elsewhere; another has a deeper suture with more convex whorls; a dwarf or stunted form occurs in many places with the type; and a monstrosity, which is not uncommon, has the peristome disconnected. Jeffreys' figure is too narrow throughout, and the whorls too compressed; but his generic figure is perfect. The banded variety is more frequent on the west coast of Guernsey, and the white one at Scilly.

Jeffreysia diaphana Ald.—Achill Island. A variety occurs at Guernsey which has a larger body-whorl and a shorter spire. Sowerby's figure is a good one, but it should be glassy white instead of brown. Jeffreys' figure is not like our shell, nor would his dimensions suit it, and his generic figure is not much better.

J. opalina Jeffr.—Scilly Islands, dredged dead (Burkill and J.T.M.); Connemara; Oban; Barra in the Outer Hebrides. Very abundant at Guernsey, but only half the length of Shetland specimens. Fossil in the Belfast deposit (Praeger)!

J. globularis Jeffr.—Jeffreys' figure is not correct in outline; it should be as Sowerby's, broader than long.

Skenea planorbis var. **trochiformis** Jeffr.—Guernsey; Arran.

Var. **maculata** Jeffr.—Land's End; Borough Island; Torbay.

Var. **hyalina** Jeffr.—Scilly; Land's End; Borough Island; Torbay; Portrush; Shetland.

A monstrosity is occasionally found in which the last whorl is distorted, and sometimes separated, as in the freshwater genus *Planorbis*.

Homalogyra atomus Phil.—Scilly Isles (Burkill and J.T.M.) Dornoch Frith (Baillie and J.T.M.); Arran; Iona; Staffa; Glenelg Castle Bay, Barra. Also a single specimen from Holsteinborg, Greenland ("Valorous")!

Var. **vitrea** Jeffr.—Jersey and Guernsey; Killala Bay.

(To be continued).

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1891. Elgar, Hubert, 3, St. Michael's Terrace, Fant Road, Maidstone, Kent.
1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
1888. Evans, Mrs. A., sen., Brimscombe Court, Thrupp, near Stroud.
1894. Evans, Wm., F.R.S.E., 18A, Morningside Park, Edinburgh.
1897. Evans-Thomas, Owen G., 83, Onslow Gardens, London, S.W.
1886. Eyre, Rev. W. L. W., M.A., Swarraton Rectory, Alresford, Hants.
1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
1897. Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorkshire.
1890. Fierke, Frederick Wm., 52, Francis Street West, Hull.
1884. Fitzgerald, Rev. H. Purefoy, Wellington College, Berks.
1886. Fitzgerald, Mrs. J., Kapai, Maidstone Road, Headcorn, Kent.
1898. Fitzsimons, J. B., M.D., 14, Owen Street, Hereford.
1892. Fulton, Hugh, 121, Fulham Road, London, S.W.

1886. Gain, Wm. Albert, Tuxford, Newark, Notts.
1895. Gamble, Frederick Wm., M.Sc.(Vict.), The Owens College, Manchester.
1896. Garnett, Roland, 26, Lune Street, Preston.
1889. Gaskell, Roger, M.A., 5, The Grove, Highgate, London, N.
1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., etc., Accrington, Lancashire.
1898. Glover, Miss Maria, 124, Manchester Road, Southport.
1886. *L* Godlee, Theo., Whips Cross, Walthamstow, Essex.
1897. Godwin-Austen, H. H., Lt.-Col., F.C.S., F.G.S., F.R.G.S., F.Z.S., F.R.S., Shalford Park, Guildford.
1886. Greene, Rev. Carleton, M.A., Great Barford Vicarage, St. Neots.
1890. Gude, G. K., 114, Adelaide Road, Hampstead, London, N.
1886. Gwatkin, Rev. Prof. H. M., M.A., Brantham Rectory, Manningtree.

1897. Hall, Thos. Bird, Larch Wood, Rock Ferry.
1887. Hanley, Sylvanus, F.L.S., Hanley Road, Hornsey Road, London, N.
1895. Hann, Rev. Adam, 14, The Crescent, Gateshead.
1895. Hardy, John Ray, The Museum, Owens College, Manchester.
1895. Hardy, John, 11, Stockton Road, Chorlton-cum-Hardy, near Manchester.
1887. Hargreaves, J. A., 3, Ramshill Road, Scarborough, Yorkshire.
1897. Harrison, Miss G. M., 14, Queen's Road, Southport.
1889. Hartley, Alfred, 19, Thorpe Garth, Idle, near Bradford, Yorkshire.
1887. Harvard, T. Mawson, 16, Radford Road, Hither Green, Lewisham, London, S.E.
1891. Hawell, Rev. John, M.A., Vicarage, Ingleby Greenhow, Middlesbrough.
1887. Heathcote, Wm. Henry, F.L.S., 47, Frenchwood Street, Preston.
1888. Heitland, Mrs. M., The Priory, Shrewsbury.

1896. Herdman, Prof. W. A., D.Sc., F.R.S., University College, Liverpool.
1887. Hey, Thomas, 8, Bloomfield Street, Derby.
1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford.
1895. Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., The Owens College, Manchester.
1893. Hill, John, Little Eaton, near Derby.
1886. Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
1886. Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.
1891. Horsley, Rev. J. W., St. Peter's Rectory, Walworth, London, S.E.
1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.
1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham Gardens, London, S.W.
1886. Hoyle, W. E., M.A., M.Sc., M.R.C.S., F.R.S.E., Keeper of the Manchester Museum, Owens College, Manchester.
1895. Hudson, Rev. Hy. A., 1, Johnson Street, Cheetham, Manchester.

1886. James, John H., A.R.I.Cornwall, Eastgate House, Lewes.
1891. Jenner, James Herbert Augustus, F.E.S., Eastgate House, Lewes.
1894. Jones, Kenneth Hurlstone, M.B., R.N., H.M.S. "Repulse," Channel Squadron.
1888. Jones, Wm. Jas., jun., 76, Mayes Road, Woodgreen, London, N.
1889. Jordan, H. K., F.G.S., The Knoll, Clytha Park, Newport, Monmouthshire.

1897. Kendig, Rev. Amos B., D.D., 86, Vernon Str.. Brookline, Mass., U.S.A.
1897. Kennard, A. S. Berrenden, Mackenzie Road, Beckenham, Kent.
1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
1887. Kew, H. Wallis, F.Z.S., 106, Mount View Road, Stroud Green.
1895. Killingbeck, J. H., Didsbury, near Manchester.
1889. Knight, Rev. G. A. Frank, M.A., Almanarre, Gareloch Head, N.B.

1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
1894. Lawson, Peter, 11, The Broadway, Walham Green, London, S.W.
1892. Layard, Edgar Leopold, C.M.G., F.Z.S., etc., Otterbourne, Budleigh Salterton, South Devon.
1878. Leicester, Alfred, Buckhurst Farm, near Edenbridge, Kent.
1889. Linter, Miss J. E., Savile Town, Heath Road, Twickenham, Middlesex.
1896. Linton, John, 25, Wordsworth Road, Smallheath, Birmingham.
1897. Lodder, Miss Mary, Lonah, Ulverstone, Tasmania.
1895. Loydell, A., 19, Chaucer Road, Acton, London, W.
1898. Lucas, B. R., 3, Dyar Terrace, Winnington, Northwich.
1891. Lyons, Lady, Kilvrough, Parkmill, R.S.O., Glamorganshire.

1889. MacAndrews, James J., Lukesland, Ivy Bridge, Devonshire.
1885. McKean, Kenneth, F.L.S., Lloyds, London, E.C.
1886. McMurtrie, Rev. John, M.A., D.D., 5, Inverleith Place, Edinburgh.
1884. Madison, James, 167, Bradford Street, Birmingham.
1885. Marquand, Ernest D., Fermain House, Guernsey.
1887. Marshall, J. T., Sevenoaks, Torquay, Devonshire.
1887. Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
1888. Mason, Philip Brooke, J.P., M.R.C.S., F.L.S., F.Z.S., Trent House, Burton-on-Trent.
1897. May, William Lewis, F.R.S. Tasm., Forest Hill, Sandford, Tasmania.
1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
1880. Melvill, James Cosmo, M.A., F.L.S., Brook House, Prestwich, Manchester.

1891. Middleton, Robert, Gledhow, near Leeds.
1888. Milne, J. Grafton, Mansfield House, Canning Town, London, E.
1879. Milnes, Rev. Herbert, M.A., The Friars, Priory St., Cheltenham.
1891. Mitchell, James, 240, Darnley Street, Pollokshields, Glasgow.
1891. Morris, Cecil Herbert, Lewes, Sussex.
1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.

1887. Newstead, A. H. L., B.A., Rose Villa, Prospect Road, Snakes Lane, Woodford.
1891. Newton, Richard Bullen, F.G.S., 7, Melrose Gardens, West Kensington Park, London, W.
1891. Norman, Rev. Canon Alfred Merle, D.C.L., F.R.S., F.L.S., etc., The Red House, Berkhampstead.
1887. Oldham, Charles, Alderley Edge, Cheshire.
1896. Overton, Harry, Brookdale, Tudor Hill, Sutton Coldfield, Warwickshire.

1882. Parke, George H., F.L.S., F.G.S., St. John's, Wakefield.
1887. Parry, Lieut.-Col. G. S., 18, Hyde Gardens, Eastbourne, Sussex.
1898. Partridge, F. J., 11, Duchess Road, Edgbaston, Birmingham.
1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock, Oxfordshire.
1896. Percival, A. Blayney, Somerset Court, Brent Knoll, Somerset.
1896. Phillips, Robert Albert, Ashburton, Cork.
1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
1898. Poore, Arthur S., 47, Griffin Road, Plumstead, Kent.
1895. Powell, Mrs. A., Nant-y-Velin, Criccieth, N. Wales.
1897. Preston, Hugh Berthon, The Manor House, Berrow, nr. Burnham, Somerset
1888. Radcliffe, John, 111, Oxford Street, Ashton-under-Lyne.

1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
1897. Rawson, Sir W. Rawson, K.C.M.G., C.B., 68, Cornwall Gardens, London, S.W.
1887. Reader, Thomas W., F.G.S., 171, Hemingford Rd., Barnsbury, London, N.
1896. Rhodes, John, F.E.S., 360, Blackburn Road, Accrington.
1898. Roberts, A. William Rymer, Annesdale, Windermere.
O Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
1886. Rogers, Thomas, 27, Oldham Road, Manchester.
1893. Roseburgh, John, 54, Market Street, Galashiels.
1892. Rosevear, John Burman, 113, New King's Rd., Fulham, London, S.W.

1877. Scharff, Robert F., Ph.D., B.Sc., M.R.I.A., Tudor House, Dundrum, Dublin.
1893. Scharff, W. E., c/o Edwards, Scharff & Co., Bradford.
1895. Schill, C. H., Broome House, Didsbury, near Manchester.
1886. Scott, Thomas, F.L.S., 14, Lorne Street, Leith, N.B.
1893. Shackleford, Rev. Lewis John, Chatburn Road, Clitheroe, Lancs.
1892. Shillito, John G., 20, Elmore Road, Sheffield.
1895. Sich, Alfred, F.E.S., Brentwood, 65, Barrowgate, Chiswick, Middlesex.
1896. Sidebotham, Dr. E. J., Erlesdene, Bowdon, Cheshire.
1884. Skilton, Mrs. Mary, 21, London Road, Brentford, Middlesex.
1886. Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideford, N. Devon.
1886. Smith, Edgar A., F.Z.S., Natural History Museum, S. Kensington, London, S.W.
1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
1894. Smith, Wm. Chas., Vanston House, 7, Vanston Place, Walham Green, Fulham, London, S.W.

1896. Smith, Wm. Rayson, Harleston, Norfolk.
1886. *L* Somerville, Alexander, B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
1887. Somerville, Rev. James E., M.A., B.D., Castellar, Crieff, N.B.
1886. Sowerby, Geo. Brettingham, F.L.S., 121, Fulham Rd., London, S.W.
1892. Span, Bartlet, Heywood Mount, Tenby, South Wales.
1896. Sparkes, Thomas, 92, Heywood Street, Moss Side, Manchester.
1886. Standen, Robert, 40, Palmerston Street, Moss Side, Manchester.
1888. Stanley, Frederick, Rokeby, Edgar Road, Margate, Kent.
1888. Stirrup, Mark, F.G.S., High Thorn, Bowdon, Cheshire.
1896. Stonestreet, Rev. W. T., 12, Wellington St., Higher Broughton, Manchester.
1885. Storey, J. A., B.A., St. Joseph's, High School, Cardiff.
1897. Stracey, Bernard, University Union, Edinburgh.
1890. Stubbs, Arthur Goodwin, 2, Deer Park Villas, Tenby.
1893. Stump, Edward Consterdine, 16, Herbert St., Moss Side, Manchester.
1895. Swanton, E. W., The Educational Museum, Haslemere.
1895. Sykes, Robert Dardsley, Lostock Hall, near Preston.
1888. Sykes, Ernest Ruthven, B.A., 3, Gray's Inn Place, Gray's Inn, London.

1895. Taylor, Frederick, 38, Landseer Street, Park Road, Oldham.
1897. Taylor, Rev. George W., F.R.S.Canada, F.Z.S., F.E.S., Gabriola Island, Nanaimo, British Columbia.
1886. Taylor, Miss Helen L., Woodside, Rowditch, Derby.
O Taylor, John W., F.L.S., North Grange, Horsforth, Leeds.
1898. Thomas, G. E., 13, Vicarage Gardens, Kensington, London.
1895. Thompson, Isaac C., F.L.S., 53, Croxteth Road, Liverpool.
1886. Tomlin, J. R. Brockton, B.A., Penrhyn House, Llandaff.
1896. Tregelles, George Fox, 5, Clarence Place, Barnstaple.
1897. Tripe, Linnæus, Major-Gen., 3, Osborne Villas, Stoke, Davenport.
1897. Tulk-Hart, Eugene John, M.D.Durh., M.R.C.S., 4, Gloucester Place, Brighton.
1898. Turner, E. Hartley, A.C.A., 21, Bairstow Street, Preston.
1880. Tye, G. Sherriff, 10, Richmond Road, Handsworth, Birmingham.

1897. Vignal, Louis, 28, Avenue Duquesne, Paris.

1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea.
1891. Walker, Bryant, 18, Moffat Building, Detroit, Michigan, U.S.A.
1896. Wallace, Harry Simpson, Art Gallery, Newcastle-on-Tyne.
1886. Watson, Rev. Robert Boog, LL.D., B.A., F.R.S.E., F.L.S., c/o W. H. Miller, Esq., M.D., 51, Northumberland Street, Edinburgh.
1895. Webb, Wilfred Mark, F.Z.S., The Broadway, Hammersmith, London, W.
1895. Welch, Robert John, 49, Lonsdale Street, Belfast.
1897. West, H. J., 80, Upland Road, East Dulwich, S.E.
1886. Whitwell, Wm., F.L.S., 4, Thurleigh Road, Balham, London, S.W.
1895. Wigglesworth, Robert, 13, Arthur Street, Clayton-le-Moors, Lancashire.
1889. Williams, John M., 4, Exchange Alley, Liverpool.
1891. Williamson, Rev. Charles Arthur, M.A., Carnew, co. Wicklow.
1898. Wishart, John, B.Sc., 25, Mount Street, Aberdeen, N.B.
1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
1898. Woods, Henry, M.A., F.G.S., St. John's College, Cambridge.
1886. *L* Woodward, Bernard B., F.G.S., F.R.M.S., 120, The Grove, Ealing, London, W.
1886. Wotton, F. W., Marguerite, Richmond Wood Road, Bournemouth.
1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

273rd (Annual) Meeting, October 22nd, 1898.

The President, Mr. J. R. B. Masefield, in the chair.

Appointment of Scrutineers.

Messrs. Williams and Madison were appointed Scrutineers.

Appointment of Auditors.

Messrs. Moss and Cairns were appointed Auditors for the year 1898.

Annual Reports and Balance Sheet.

The Annual Report of the Council (see p. 147), the Reports of the London and Leeds Branches (see p. 148, 149), and the Treasurer's Balance Sheet (see p. 149) for 1897 were presented and adopted.

Election of Office-Bearers.

The Scrutineers reported that thirty-six voting-papers had been sent in, of which thirty-four voted for the list of officers as nominated by the Council. The list was therefore declared carried as on p. 139.

Vote of Condolence.

It was unanimously resolved that the Secretary be instructed to convey to the relatives of the late Mons. H. Crosse an expression of the Society's sympathy in their bereavement and of regret for the loss which the Society and conchological science have sustained.

New Honorary Member Elected.

Mr. William Healey Dall, of the Smithsonian Institution, Washington, having been nominated by the Council, was unanimously elected an Honorary Member, in the room of the late Mons. Hippolyte Crosse.

New Member Elected.

Mr. Arthur William Rymer Roberts, Annesdale, Windermere.

Candidates Proposed for Membership.

Mr. H. Rowland Wakefield ; Mr. Leonard F. Biddle ; Mr. E. Hartley Turner.

Resignation of Members.

Miss Alice Maud Dale ; Mr. G. E. Hadow.

Member Deceased.

Mr. T. F. Burrows.

Place of Meeting.

On the invitation of the newly-elected President, Mr. Lionel E. Adams, it was unanimously resolved that the next annual meeting be held at Stafford.

The Presidential Address

Was then delivered by the retiring President, Mr. J. R. B. Masefield, who took for his subject "The Economic Use of some British Mollusca" (see p. 153).

A vote of thanks to the President for his Address was proposed by Mr. J. Cosmo Melvill and seconded by Mr. Wells Bladen (the Secretary of the North Staffordshire Field Club), and carried unanimously, after which the Meeting adjourned.

Exhibits.

By Mr. J. R. B. Masefield : *Helix pomatia* from Gloucestershire ; and sinistral specimens from France. *H aspersa*, showing gradation of colouring from var. *exalbida* to var. *nigrescens*, also sinistral and scalariform monstrosities. Series of typical, varietal, and sinistral *H. nemoralis* from Donegal, Ireland. Sections of *Helix*, *Planorbis*, *Clausilia*, *Paludina*, etc. *Dreissensia polymorpha*, from Colwich, Staffs. ; *Anodonta cygnea*, with shell pierced by rooks to feed upon the animal ; *Unio pic-*

torum, *U. tumidus*, and var. *ponderosa*, from Copmere, Eccleshall, Staffs.; *U. margaritifer* from Wales, and pearls from the same species, taken in Clady river, co. Donegal, Ireland.

By Mr. J. M. Williams: Some unusually large and richly-marked varieties of *Cypræa tigris*, and two remarkable forms of *C. mauritiana*, one perfectly black; a fine series of the peculiar New Caledonian forms of the genus *Cypræa*, including *C. niger*, *C. caledonica* (=*lynx* var.), *C. errones*, and *C. cylindrica*; two specimens of *C. obvelata* var. *calcarata*, *C. isabella* var. *controversa*, and some others, including a gigantic specimen of *C. arabica*, and curious varieties of *C. caput-serpentis*.

By Mr. W. H. Heathcote: *Jouannetia cumingi*, from Philippines; *Siliquaria anguina*, from Moluccas, and *S. echinophora*, from Japan; a fine series of *Coricella nigra*, and species of *Stylifer*; *Eulima martini* and *E. metcalfei*; series of *Emarginula crassa*, *Callochiton lævis*, and *Lasæa rubra* var. *pallida*, collected in October, 1898.

By Mr. R. Standen: *Vertigo moulinsiana*, collected at Wicken, by Mr. J. B. Tomlin in September last; series of young forms of *Anodonta cygnea* and *Unio pictorum*, with sets of pearls from latter species; white forms of *Bythinia tentaculata*, from Ireland; series of the large sub-fossil *Helix nemoralis*, from Dogs Bay, Connemara; *Limnæa gracilis*, from Hamilton, Ontario; *Rhodea gigantea*, a rare and remarkable land shell, from New Granada; *Anomia enigmatica*, attached to leaf of the mangrove, from Singapore; *Ancylus irvinæ*, from Great Lake, Tasmania; series of *Succineæ*, from United States, Hungary, India, and Upolu.

By Mr. Thomas Edwards: *Fusus antiquus*, typical from North Sea, and monst. *sinistrorsum* dredged alive off Isle of Thanet; *Buccinum undatum*, a fine series of sinistral and acuminate forms, from Isle of Thanet; and *Helix nemoralis* with single white band, from Leicester.

By the Rev. J. W. Horsley: Unusual forms of *Helix nemoralis*, with rare band formulæ, and a fine specimen of *Limnæa stagnalis*, from River Lea, showing in a very perfect manner regular bands formed by injury to the mantle of the animal in an early stage.

By Mr. A. G. Stubbs: An extremely fine collection of land and freshwater shells from Tenby, Brighton, and Gloucester.

By Mr. Edward Collier: A large and interesting series of exotic land shells, to shew (*a*), brilliance of colouration; (*b*), epidermal markings; (*c*), peculiarities of form in certain species, and eccentricity in growth of mouth, as in *Anostoma*, *Cylindrella*, etc.; (*d*), differences in size from small *Diplommatinæ* to very large *Achatinæ*; also a number of specimens collected during the Irish Field Clubs' Excursion to Kerry, in July, 1898, including *Limnæa involuta*, *Succinea oblonga*, *Acme lineata*, and *Pupa anglica* var. *alba*.

By Mr. J. Madison: Models of the British slugs; case of freshwater shells, including *Physa heterostropha* Say, taken near Birmingham.

By Mr C. E. Wright: A large series of *Helix nemoralis* and *H. hortensis*, chiefly from Northamptonshire, including many rarities; a case of large *Limnæa stagnalis*, from Naseby Reservoir; living specimens of *Helix terrestris*, *H. obvoluta*, and a remarkable scalariform *H. hortensis*, 12045, found near Kettering.

By Mr. R. Welch: An album of platinotype views of Irish scenery, chiefly illustrative of the habitats of certain Irish mollusca quoted in some recent papers on the subject.

By Mr. Lionel E. Adams: The whole of the very complete and extensive collection of land and freshwater shells, formed almost entirely by Mr. Adams himself, in England, Wales, and Ireland during the last twenty years.

ANNUAL REPORT, 1897-98.

In drawing up the Annual Report for such a society as ours, it is not always possible to find some new subject for special gratification or congratulation, but at the same time it is a pleasant duty to chronicle another year of unimpaired vitality in all departments of the society's work.

It is hardly a year, however, since the last Annual Meeting was held at the Manchester Museum, indeed the report only covers a period of eleven months, and includes but seven meetings.

There has not been a very numerous accession of new members during the year; there have been eleven elections, ten resignations, and three deaths, while one member has been declared a defaulter by reason of non-payment of overdue subscriptions. The society thus counts three members less than in the preceding year, and the numbers now stand as follows: 9 honorary members, and 231 ordinary members, of whom 24 reside abroad, making a total of 240.

The Council deeply regrets to have to record the death of Monsieur H. Crosse, the eminent French conchologist, who was one of our oldest honorary members, and of whose career an account will, it is hoped, appear in the pages of the Journal.

The Society has further to deplore the loss of Dr. E. B. Landis, of Chemulpo, Corea, who only joined this society in February last, and died a few months later, whilst within the last few days the decease of Mr. T. F. Burrows has been announced.

The attendance at the meetings which have been held since last November has been quite up to the average of former years, but in accordance with the general custom of the Society, the meetings were omitted during the summer months.

On May 22nd, some half-dozen members profited by the kindness of the President, and joined an excursion into North Staffordshire, which proved most enjoyable and profitable. A full account of it was read at the June Meeting of the Society, and has already been published in the October number of the Journal.

It will be remembered that at the last Annual Meeting it was announced that the Council had resolved upon an increase in the size of the Journal. This has now been effected by means of increasing the size of page and decreasing the spacing, thus obtaining an enlargement of some twenty-five per cent. It is satisfactory to note that the additional room has so far been fully occupied, the Editor having had in hand an unusually large number of papers and notes, which have been read before the Society and either have been or shortly will be published.

The following is a list of these communications:—

Lionel E. Adams: "Observations on the Pairing of *Limax maximus* L."
F. Taylor: "The Land and Freshwater Mollusca of the district between Ashton-under-Lyne and Oldham."
J. R. B. Masefield: "*Testacella haliotidea* in North Staffordshire."
L. E. Adams: "*Paludestrina* (*Hydrobia*) *jenkinsi* Smith in Ireland."
L. E. Adams: "Sense of Smell in *Limax maximus* L."
Peter Lawson: "British snails as human food."
G. W. Chaster: "Mr. J. T. Marshall's criticisms: An answer."
R. Standen: "Notes on the Land Mollusca of Grange-over-Sands, Lancashire."
R. Standen: "*Helix nemoralis* monst. *sinistrorsum* in Lancashire."
J. Cosmo Melvill and R. Standen: "The Mollusca of the Falkland Islands."
R. Standen: "Note on *Terebra eximia* Dh."
J. Cosmo Melvill: "On *Latirus armatus* Ad."

A. G. Stubbs: "Observations on Abnormality in *Planorbis spirorbis* and other freshwater shells at Tenby."
J. Cosmo Melvill: "Note on *Scalaria fimbriolata* Melv."
Rev. J. W. Horsley: "*Hyalinia cellaria* in Walworth."
J. Cosmo Melvill: "Note on *Cyprœa rashleighana*."
W. E. Collinge: "Note on a new variety of *Testacella maugei* Fér."
L. E. Adams: "Note on *Clausilia cærulea* Fér. in Hants."
Rev. A. Hann: "Note on *Paludestrina jenkinsi* near Middlesborough."
A. G. Stubbs: "Observations on *Limnæa peregra*."
J. E. Cooper: "Note on *Valvata cristata*."
L. E. Adams: "*Paludestrina jenkinsi* Smith in two new Irish localities."
L. E. Adams: "*Arion ater* var. *rubra* Baud. new to Britain."
R. Welch: "New county records for Ireland."

Four numbers of the Journal, containing 128 pages and four plates, have been issued since November last. Since the Annual Meeting of 1897, volume viii. of the Journal has been completed by the addition of a title-page, a fairly full subject index and a list of explanations of plates, printed on separate sheets, to be bound opposite the plates themselves. This arrangement is a new departure in the history of the Journal, and it must be stated that the additional cost was not inconsiderable, amounting to about £3.

The publication of the Journal in its new form has involved a further outlay in this department, and it is most desirable that a marked increase in the membership of the Society should take place in the immediate future, so that the Council may be justified in continuing the increased expenditure. The average cost of each number of the Journal in its old form was about £9, while it now amounts to about £11 10s.

Considerable loss having been sustained by the Society on account of the sending of Journals to members whose subscriptions were in arrears, and who were ultimately declared defaulters, the Council decided in April last:—

"That the first three numbers of the Journal for each year be sent to those members who are not in arrear as regards the previous year's subscription, and that when the October number is ready for publication a notice, under cover, be sent to all members who have not then paid the current year's subscription, and that the Journal be not forwarded till payment has been made." This arrangement will therefore come into operation in the year 1899.

With regard to the Society's Library, it is satisfactory to note that more than the usual number of serials and other books and papers have been received this year, and that a complete card catalogue of the Library, on the Dewey decimal system, has been prepared under the supervision of the Librarian, and presented to the Society by him.

During the past year considerable use has been made of the Society's Collections, both by local members and others residing at a distance who chanced to visit Manchester. The Curator has, during the year, mounted portions of the collections in glass-topped boxes, and only a small proportion now remains unavailable for ready reference. The Society is again indebted to Mr. A. G. Stubbs for further additions to the fine series of specimens presented by him.

LONDON BRANCH.—Annual Report.

Since the last report eleven meetings of this branch have been held; of these, five were field-meetings, viz., at Tottenham, Barnes Common, Swanley, Hampton Wick, and Abbey Wood. The meeting at Barnes, on June 4th, 1898, was well-attended, and a number of freshwater species were collected. The Swanley

meeting on July 9th was also a success. At the other field-meetings, chiefly owing to the very dry season, but few land shells were collected. On November 11th, 1897, an exhibition of *Helix aspersa* was held; nearly all the named varieties were shown, and the Rev. J. W. Horsley contributed some notes. On December 3rd Mr. DaCosta very kindly allowed the members to see a further portion of his fine collection. Our thanks are also due to Colonel Beddome, F.L.S., and to Mr. J. C. Dacie for inviting the Society to inspect their collections; unfortunately in both cases very few members were able to accept the invitation. During the past year four new members have joined this branch.

28th September, 1898. J. E. COOPER, *Hon. Sec.*

LEEDS BRANCH.—Annual Report.

The Leeds Branch has had a prosperous and enjoyable year, and several meetings have been held at the residences of members. One or two papers have been read, but the chief interest has been in the exhibition of specimens, of which the number and the value have been considerable. The Annual Meeting of the Branch was held in April last, when Mr. Henry Crowther was elected President, and the undersigned Hon. Secretaries—

WILLIAM NELSON,
W. DENISON ROEBUCK, } *Hon. Secs.*

Treasurer's Report.

The financial condition of the Society remains much the same as before. It is noteworthy that though the receipts have been the largest ever received in any year hitherto, and that generous donors, who wish their names suppressed, have contributed £18 9s. 6d. to the funds of the Society, yet the expenses have been correspondingly heavy. LIONEL E. ADAMS.

BALANCE SHEET.

Receipts:	£	s.	d.
Balance from 1896	5	1	3
Subscriptions received in 1897	66	0	0
Life Composition Fees	4	5	6
Donations	18	9	6
Sale of Lists, Reprints, and Back Nos. of *J. Conch.*	11	11	5
By Advertisements	3	0	0
	£108	7	8

Payments:	£	s.	d.
Cost of Journals (vol. viii., nos. 8, 9, 10, 11, 12) ...	56	14	4½
Secretary's and Editor's Expenses	10	13	9
Treasurer's Expenses	4	5	2
Stationery	6	2	5
Cost of Reprints and Plates	16	0	3
Second Instalment of Purchase Money of *Q. J. Conch.* to Mr. J. W. Taylor	10	0	0
Purchase of Taylor's Monograph	0	15	9
Rent of Leeds Room	0	10	6
Subscription to Y.N.U. ...	0	3	6
In hand...	3	1	11½
	£108	7	8

LIONEL E. ADAMS, *Treasurer.*

Audited and found correct,
E. C. STUMP.
J. H. KILLINGBECK.
November 14th, 1898.

274th Meeting, November 9th, 1898.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted :

The Irish Naturalist, vol. 7, nos. 7-11 ; the Scottish Naturalist, nos. 27 and 28; the Naturalist, 498-502 ; Science Gossip, vol. 5, nos. 49-54 ; Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 42, parts 3 and 4 ; Annual Report Microscopical Society for 1897 ; La Feuille des Jeunes Naturalistes, ser. 3, nos. 333-337 ; Journal de Conchyliologie, vol. 45, no. 4, vol. 46, no. 1 ; Transactions and Proceedings of the Perthshire Society of Natural Sciences, vol. 2, part 6 ; the Nautilus, vols. 3-10, and vol. 12, nos. 2-6 ; Abstract of Proceedings of the Royal Society of New South Wales, May 4th, June 1st, and July 6th ; Journal and Proceedings, vol. 31, 1897 ; Revista Museo Nacional, Rio de Janeiro, vol. 1 ; Transactions of the Royal Society of South Australia, vol. 22, part 1 ; Bulletin of the Buffalo Society of Natural Sciences, vol. 5, nos. 1-5, vol. 6, no. 1 ; Journal and Proceedings of the Hamilton Association, no. 14 ; Report of the Trustees of the Australian Museum, Sydney, for 1897 ; Report of the Keeper of the Manchester Museum, for 1897-98 ; Armature of Helicoid Landshells, by G. K. Gude ; Deep-water Mollusca of the Atlantic Coast, by A. E. Verrill and K. J. Bush ; Nomenclature of the Seams of the Lancashire Coal Measures, by H. Bolton ; List of the Types and Figured Specimens of Cephalopoda in the British Museum (Nat. Hist.), by G. C. Crick ; Catalogue of the Fossil Bryozoa in the British Museum (Nat. Hist.), by J. W. Gregory ; Zoological Nomenclature, Remarks on the proposed International Code, by Rev. T. R. R. Stebbing ; Irish Field Clubs Union : Kenmare Conference, Report on Mollusca, by R. Standen ; Australian Museum Records, vol. 3, no. 4.

Donations to Cabinet announced and thanks voted :

By Mr. J. Madison : *Physa heterostropha* Say, taken near Birmingham.

New Members Elected.

Mr. Leonard F. Biddle, 21, Canning Street, Liverpool.

Mr. E. Hartley Turner, 21, Bairstow Street, Preston.

Mr. H. Rowland Wakefield, 7, Montpelier Terrace, Swansea.

Candidate Proposed for Membership.

Mr. William Wells Bladen.

Papers Read.

"The Land and Freshwater Mollusca of Somersetshire," by E. W. Swanton.

"*Pupa anglica* Fér. var. *alba* nov.," by E. Collier.

"*Helices* climbing in dry weather," by K. Hurlstone Jones.

"*Limnæa peregra* abandoning its shell," by K. Hurlstone Jones.

"Discovery of a *Physa* new to Britain," by J. Madison.

"*Fusi* on the Norfolk Coast," by Carleton Greene.

"Additional Note on *Cæcilioides acicula*," by J. W. Horsley.

"*Helix acuta* monst. *sinistrorsum* at Tenby," by Fred. Taylor.

"Remarks on the cause of Abnormality in *Planorbis spirorbis*," by R. Standen.

"*Vertigo moulinsiana* Dupuy in Cambridgeshire," by R. Standen.

Exhibits.

By Mrs. Janet Carphin : *Helix nemoralis* and varr. *roseolabiata*, *albolabiata*, and *bimarginata*, Dollar and Eyemouth, var. *rubella*, Birnam ; *H. hortensis* var. *olivacea*, Eyemouth ; *H. hispida* monst. *sinistrorsum*, Coldingham ; *Pupa marginata*, Eyemouth ; *Vertigo edentula*, Birnam and Luss ; *V. pygmæa*, Birnam ; *Planorbis nautileus*, Coldingham

By Mr. R. Cairns : *Helix virgata* from sand dunes between Rossall and Blackpool. This species was first noticed near Rossall School, about twelve years ago,

and has since spread slowly but steadily southwards. There is strong evidence of its introduction. The shells have always been remarkably uniform in colouring, but have increased greatly in size of late years, and this year very large examples occurred.

By Mr. B. K. Lucas: A representative collection of the shells occurring in the neighbourhood of Winnington, Cheshire, comprising *Helix nemoralis*, small but brightly-coloured specimens with ordinary bandings; *H. hispida*, *H. fusca*, Marbury; *H. aculeata*, Owley Wood; *H. rotundata*, *Hyalinia cellaria*, *H. alliaria*, *H. nitidula*, *H. crystallina*, *H. fulva*, *H. glabra*, very fine, from Marbury, and *H. excavata* var. *vitrina*, from Owley Wood and Marbury; *Cochlicopa lubrica*, *Clausilia rugosa*, *Pupa anglica*, from Marbury; *Limnæa peregra* var. *labiata*, Hartford; *L. truncatula*, Comberbach; *L. stagnalis* var. *fragilis*, Marbury; *L. palustris*, large, but much eroded, Hartford; *L. glabra*, near Knutsford; *Physa fontinalis*, Barnton; *Planorbis contortus* and *Unio tumidus*, from Marbury.

By Mr. R. Standen: *Vertigo moulinsiana* from several English localities; and microscopic preparations of *Epistylis anastatica*, to illustrate notes read at the meeting.

By Mr. J. D. Dean: Two remarkably fine specimens of *Pinna rudis*, to one of which a gigantic specimen of *Capulus hungaricus* was attached, dredged between Lizard Point and the Manacles, in from sixty to eighty fathoms.

By Mr. Fred. Taylor: A fine set of *Helix pulchella*, Riversvale, Ashton-under-Lyne; *Sphærium lacustre*, Bardsley Canal; a fine series of *Pisidia*, Fitton Hill; and a sinistral specimen of *Helix acuta*, the Burrows, Tenby.

By Mr. W. Moss: *Succinea cuvieri* and *Pupa pellucida*, Grenada; *Rhytida coguiensis*, New Caledonia; and micro-photographs and slides showing the radula and genitalia of *Succinea oblonga*, from Kenmare, county Kerry.

275th Meeting, December 14th, 1898.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted:—

The Naturalist, no. 503; La Feuille des Jeunes Naturalistes, ser. 3, no. 338; Irish Naturalist, vol. 7, no. 12; the Nautilus, vol. 12, no. 8.

New Member Elected.

Mr. William Wells Bladen, Stone, Staffordshire.

Letter Read.

From Mr. W. H. Dall, acknowledging the announcement of his election as an Honorary Member of the Society.

Papers Read.

"Notes on the *caput-serpentis* group of the Genus *Cypræa*," by J. Cosmo Melvill.

"Note on *Mitra* (*Pusia*) *rhodochroa* Hervier, and *M. rhodinosphæra* Melv.," by J. Cosmo Melvill.

"Dredging at Seaton, Devon," by L. St. G. Byne.

"*Helix virgata* monst. *sub-scalariforme*, at Churston Ferrers, South Devon," by Alfred Sich.

Exhibits.

By Mr. Fred. Taylor: A series of very large *Helix pisana*, taken in a cabbage garden at Tenby. The abundance of food had doubtless been the cause of the extraordinary increase in the size of these shells, as compared with a series of specimens collected on the neighbouring sand-dunes, which were considerably under the average size.

By Mr. Edward Collier: A beautiful series of *Pisidium pusillum*; *Limnæa involuta*; *Succinea oblonga*, *S. putris*; *Pupa anglica*, and varr. *pallida* and *alba*;

Acme lineata and var. *alba*; *Carychium minimum*; *Hyalinia fulva*; *Helix lamellata*; *Clausilia perversa* var.; *Pupa cylindrica*, from Kenmare and Killarney; also very fine *Hyalinia nitida*, from Canal Bank, Stafford.

By Mr. J. Cosmo Melvill: *Mitra rhodinosphæra* Melv., from Mauritius; and *M. rhodochroa* Herv.

A fine series of *Cypræa caput-serpentis* L. and its varieties *anguis* Phil., and *colubri* Kenyon, were exhibited in illustration of Mr. Melvill's papers. These were from the collections, respectively, of Messrs. Melvill, Darbishire, Williams, Standen, Hardy, Heathcote, Rogers, and Cairns. Specimens, including the type, of *C. caput-draconis* Melv. were also shown by Messrs. Melvill, Williams, and Standen.

By Mr. Alfred Sich: A living *Helix virgata* monst. *sub-scalariforme*, from Churston Ferrers, South Devon.

Pupa anglica Fér. var. **alba** nov.—Whilst away in July last, at the Irish Field Clubs Union Conference at Kenmare, County Kerry, I collected as many of the shells of the district as the very dry weather would allow. From Mucksna Wood, Kenmare, I brought back a large bag of moss shakings and dead leaves. On looking over this on my return home I found along with other shells a considerable number of *Pupa anglica* Fér., and amongst them four specimens, two of which were immature, of a pure white variety. As all the other British *Pupæ* have acknowledged white varieties, I propose to call this one var. *alba*. All the specimens I got were alive, and when the animal was crawling it was all pure white with the exception that when the tentacles were extended the eyes shewed as vivid black spots. I hear from my friend, Mr. R. Welch, of Belfast, that he found one specimen of this same variety amongst dead and very damp beech leaves on the margin of a wide drain in the demesne at Caledon, County Tyrone, on February 12th, 1897. Mr. J. Ray Hardy also told me that he had collected this same variety some sixteen years ago near Killarney, but although my friend Dr. Chaster and I looked very carefully for them we did not succeed in finding any, but I am glad to say that Mr. Lionel E. Adams and Mr. Stubbs, who visited Killarney in September, were fortunate enough to discover the locality, and found this variety in considerable numbers.—EDWARD COLLIER. (*Read before the Society*, Nov. 9th, 1898).

Discovery of a Physa new to Britain.—On July 19th in a pool at the west side of Birmingham, I found some rather large *Physæ*, and on comparing them later with some American forms, they seemed to me very similar to *Physa heterostropha*. I sent some to my old friend, Mr. W. Nelson, who wrote at once saying that he thought they were *Physa heterostropha* Say, but expressed a wish to see living specimens before deciding for certain. I then sent him some alive, and he placed them at the disposal of Mr. J. W. Taylor, who from the digitations of the mantle, so unlike that of *Physa fontinalis*, fully confirmed our opinions as to the identity of the species. Some of the shells measured 18 mm. long and 11 mm. wide, varying in the length of the spine, and some have the lip much expanded. They were fairly plentiful in company with *Limnæa peregra*.—J. MADISON. (*Read before the Society*, Nov. 9th, 1898).

Note on Mitra (Pusia) rhodochroa Hervier **and M. rhodinosphæra** Melv. —These two are identical, and M. Hervier has unfortunately overlooked the description of *M. rhodinosphæra* (*J. Conch.*, vol. 5, p. 286, pl. ii., fig. 23, 1887). The original type came from Mauritius, but, as Mr. Standen and I pointed out in our papers on the Loyalty Islands mollusca, many Mauritian species find their way to Lifu; *M. eximia* Reeve is an instance of this.—J. COSMO MELVILL. (*Read before the Society*, Dec. 14th, 1898).

THE ECONOMIC USE OF SOME BRITISH MOLLUSCA.

(The Presidential Address delivered at the Annual Meeting, Oct. 22nd, 1898).

By J. R. B. MASEFIELD, M.A.

Before proceeding to the main subject of my address this evening, I desire to place on record my own regret at the losses which the Society has sustained during the year in the deaths of three of its members. One of these was an honorary member, Mons. H. Crosse, the eminent French conchologist, a sketch of whose life and work will be given elsewhere.

Another was Dr. E. B. Landis, who only became a member of our Society in February last, and died shortly afterwards at Chemulpo, Corea, of typhoid fever. From him we were expecting important communications as to the mollusca of that distant country. The Rev. J. W. Horsley, in writing to send us the sad news, says:—"A colleague writes, his loss is not only one which we as a mission or as individuals will feel, but a real loss to Corea, with which he had thoroughly identified himself. As a doctor he will be missed very much by the residents, native and foreign. As a student he was amongst those who knew most of Corea, her history, and her people; and as a scientist he was always trying to learn more of Corean animal and vegetable life. It is only a year ago that we were out together hunting for snail shells in the Paddy Fields, and killing the snakes that infest them."

The third member whose death we have to deplore is Mr. Thos. F. Burrows, formerly of Cheadle in this county, to whom I owe a deep debt of gratitude for his unfailing kindness and for the valuable assistance he gave to me in preparing a list of our North Staffordshire mollusca a few years ago. Although during the last two years illness had prevented his doing much field work in conchological science, we must all feel that we have lost in him one of our hardest workers and most useful members.

Our Society was represented at the International Congress of Zoology, held at Cambridge, in August last. At that meeting it was announced that favourable arrangements had been made with the international postal authorities for the transmission of zoological specimens, which will I am sure be welcome news to our members. The question of zoological nomenclature, which many of us were anxious to hear discussed, was unavoidably postponed. Several papers relating to conchology were read, and amongst others, one by Mr. F. W. Harmer on "The Distribution of *Fusus antiquus* and its Allies," and another by Dr. Plate on "The comparative anatomy of Chitons"; whilst the Cambridge Museums, with their conchological collections,

were much appreciated by the members of our Society attending the Congress.

In these utilitarian times it is becoming every day more self-evident that to preserve our native fauna we must be able to show what place and use the various species composing it are intended to occupy and fill in nature. We are all of course agreed that every species of animal has its own special office to discharge and fills some special place in the scheme of nature. In many cases, however, it is not easy, except for those who are conversant with the whole life-history of a species, to convince an untutored mind that to keep the proper balance of nature such species of animal life must be preserved. In the case of our mollusca generally, it must be admitted that to a casual observer the slimy form and crawling habits of these animals are at first sight both repulsive and repugnant to man, and man's natural instinct is at once to destroy such forms of life as blots in creation, and as probably in some way damaging to man's welfare. In the short time at my disposal to-night I therefore propose to set before you some of the natural functions performed by some of our British land and freshwater mollusca, so as to entitle them to the protection of man within due bounds rather than to destruction and extermination.

The uses of the mollusca may then I think be arranged under four principal heads :—

I.—As scavengers and helps to sanitation and to the preservation of the health of man.

II.—As food and medicine for man.

III.—As food of other animals.

IV.—As articles of merchandise, and so contributing to the wage-earning of men.

I.—*As scavengers and helps to sanitation, and to the preservation of the health of man.*

In considering this part of my subject I have carried out certain experiments and investigations, to prove as far as possible in what numbers and to what extent our native mollusca are found on land and in our inland waters. It is of course well known that some species are arboreal in their habits to a certain extent, such as *Limax marginatus*, *Helix nemoralis*, *H. hortensis*, *Buliminus montanus*, *B. obscurus*, and the *Clausiliæ*—others require shade and retirement, such as *H. hispida*, *H. aculeata*, and many of the *Pupæ*—others are found in damp places under stones and decaying wood and in damp buildings, such as the Zonitidæ—others on warm dry cliffs, such as *H. pisana* and *H. acuta*—others on dry downs and sand-hills, such as *H. virgata*, *H. itala*, etc.—others are marsh-dwellers, as the *Succineæ*—others, again, are subterranean, such as the *Testacellæ* and *Cæcilioides*

acicula. And then we have the freshwater mollusca, thus showing that these animals are to be found really everywhere.

The habitations of man appear to have a special attraction for many species, no doubt on account of the surrounding cultivation affording tempting food, and the crevices of man's buildings providing safe retreats during the day. On the other hand, non-cultivation appears to be necessary to the survival of some species. Gwyn Jeffreys says on this subject:—"There is probably not a square rood of land either in a cultivated or uncultivated state, or covered with fresh, brackish, or salt water, that is not inhabited by mollusca of various kinds. Trees and herbage are the chosen stations of many sorts, for the sake of the shelter or food which they afford; and even our cellars and kitchens are not free from them." Again, Mr. Lionel E. Adams, in his excellent "Manual" says of *Agriolimax agrestis* that it "swarms everywhere," of *Helix rotundata* "found everywhere in sheltered spots," and of *Limnæa peregra* "distributed over every part of the Eastern Hemisphere." The truth of these statements I am now able to confirm as far as this country is concerned. A correspondent in Herefordshire, on a plot of cultivated land, 95 yards long by 5 yards wide, and therefore containing 475 square yards, placed 100 flat pieces or boards of old decaying wood, each about 18 inches long by 6 inches wide, and during three consecutive years the average number of snails and slugs taken from under these boards was 18,000 per annum, but it must be borne in mind that at least a quarter as many more would be taken by thrushes and other birds on the same ground. Each of these boards, my informant states, at first produced about sixteen molluscs every three days. The annual average has now become reduced to only 300 molluscs, and this year only 152 have been taken on the same ground, showing that it is possible by these means to almost exterminate these animals altogether in a given area of ground within a given time. On another patch of ground, containing only five square yards, two similar boards to those I have described were placed, and these yielded on a first examination 44 slugs, next time 22, then 11, and afterwards only 1. These slugs and snails are stated to have comprised 13 species, but now only 6 species are to be found on the same ground, the others, it is presumed, have become exterminated. As to the exact species, I am sorry to say that I have not sufficient evidence at present to identify them. Similar experiments made by myself in my own grounds give an average of 15 to 20 slugs (principally *Agriolimax agrestis* and *Arion hortensis*) to be found on every square yard of ground, and I believe about the same average will be found generally over all pasture, arable, and other land; this may easily be ascertained just at dusk any wet or damp evening during open weather with the aid of a lantern.

On one excursion of some of the members of our society, it is recorded that upwards of 3,000 specimens of *Vertigo* were collected in one day in one limestone quarry near Clitheroe, and in one garden in Hampshire 1,591 *Helix aspersa* were killed in four nights. The abundance of the amphibious *Limnæa peregra* in every pond and muddy hole, and of *Helix rotundata* in every sheltered spot, is well known to all conchologists. The rate of increase of *Agriolimax agrestis* is enormous, as a single pair have been known to lay 800 eggs.

These facts, then, taken in conjunction with the Distribution Tables of the Referees of our Society, will, I think, give some idea of the general abundance of our mollusca all over the country, and as their food consists to a great extent of decaying animal and vegetable matter, no doubt can remain as to the amount of useful scavenging these animals perform. Another well known fact is that the decaying vegetable rubbish heaps and heaps of wayside hedge and bank croppings are irresistibly attractive to many of our molluscs, and form some of their chief feeding-grounds, being in close proximity to their retreats in the dense bottoms of hedgerows and thickets; and thus our country roads are to a great extent kept in a sanitary and wholesome state. Again, in neglected arable and fallow land, so frequently covered by a mass of weeds, especially of the coltsfoot, which in wet autumn weather quickly decay, we see these fields cleared of this unhealthy mass as well as of decaying fungi by our slugs and snails. To show the pertinacity of *Arion ater* in clearing away decaying animal matter, I have seen several of these molluscs crossing a pond by means of the floating vegetation to reach a putrefying mass in the water.

Then we find every nook and cranny in our old walls to be the abode of some mollusc during the daytime, which sallies forth at dusk to clear these walls and their surroundings from decaying matter. Many of our most noxious garden weeds also form part of the food of some of our molluscs, and so are kept in check to some extent by them. Our large slug, *Limax maximus*, is a most useful dweller in our cellars and drains, where by feeding on the accumulated greasy and fatty matter adhering to the insides of pipes, where no other living animal can penetrate, it assists in keeping drains open and free to ventilation. One of our members, the Rev. J. W. Horsley, shows the value of another mollusc (*Hyalinia cellaria*) in the following note contributed to our Journal (July, 1898) :—"The other day a drain in my area being blocked, I found it necessary to open the ground in the forecourt, and in so doing found an unexpected man-hole covered with slabs of stone. When these were lifted, I found four fine specimens of *Hyalinia cellaria* on the under-surface of the stone where they must have lived always in the dark and exclusively on what a scullery pipe brought down. Walworth is in the densest part of South London,

where we live 200 people to the acre, and expect to find shells as little as ferns."

Our arboreal species of molluscs spend the summer and autumn months on the trunks and amongst the branches of many of our forest trees, keeping them clear of deleterious and decaying matter, and I believe many species ascend our forest trees to feed upon the honey-dew on the leaves.

The Testacellidæ, again, feed exclusively on worms, and assist in keeping their numbers down, and so help in preserving a healthy balance of nature; whilst the subterranean dweller, *Cæcilioides acicula*, acts the part of scavenger underground. Mr. Shrubsole states that a gardener near Chester purposely keeps *Testacellæ* to kill the worms in his fernery.

Further, if we examine our inland waters, we find them all teeming with molluscan life, without the presence of which all these waters would soon become seriously contaminated with decaying animal matter, and choked up with confervoid growths. This is well known to all who keep aquaria, wherein it is absolutely necessary to preserve a proper balance of animal and vegetable life to maintain the water in a pure state and the glass clear. The presence of our large bivalves (*Unio*, *Anodon*, *Sphærium*, *Dreissensia*, and other syphon possessors) contributes to maintain clearness and purity of water in muddy lakes, canals, and ponds, as their chief food consists of infusoria and other floating organisms. But perhaps some one may say that these molluscs can only perform these useful duties in summer and autumn, if they hibernate during the winter and early spring; but this is not so. Several species, such as *Helix fusca*, *H. caperata*, *Vitrina*, and others, become active during the winter months, except in severe frosts, and I have seen *Vitrina* many times crawling over snow in search of food.

As to the variety of food of our mollusca, it is almost endless, but amongst other things which they devour greedily is waste paper of all kinds when reduced to a pulpy state by water or rain, and even bivalves revel in this food. They also live on dead insects of all kinds, including flies, moths, and butterflies, and on one occasion *Helix aspersa* was found feeding on the decaying eggs in a deserted bird's nest, having first perforated the shell to get at such a choice morsel. I hope I have now stated sufficient facts to show that our mollusca are amongst the most useful of nature's scavengers, and also how very plentifully they are distributed over the length and breadth of our land; but if anyone is still sceptical, I can only repeat, let him sally forth any damp night, and he will soon discover for himself that no decaying or unhealthy matter escapes the attention of our slugs and snails, which, I maintain, are some of our best friends in the preservation of the health of man.

II.—*As food and medicine for man.*

Lovell in his "Edible British Molluscs" mentions four species of our Helicidæ, viz., *H. pomatia*, *H. aspersa*, *H. nemoralis*, and *H. pisana*, as the only edible species amongst our land and freshwater molluscs. We can easily understand that the families Arionidæ, Limacidæ, and Testacellidæ, are not exactly attractive as food for man, their food habits being, as Mr. Adams expresses it, "not nice." At the same time, I have met with several instances where *Agriolimax agrestis* has been regularly eaten as a cure for consumption. The Vitrinidæ, Zonitidæ, Pupidæ, and the smaller freshwater mollusca are all far too small to be of any practical value as human food, and thus we have left only the remaining Helicidæ (of which I shall say more later on) and the larger Limnæidæ (*L. peregra* and *L. stagnalis*), the Paludinidæ, Unionidæ, and *Dreissensia*. Of these the Limnæidæ and Paludinidæ are both mud-dwellers and carrion feeders to a great extent, and would probably prove unwholesome, if not poisonous, as food for man. If obtained from pure spring water I do not see why both the Unionidæ and *Dreissensia polymorpha* should not prove palatable and wholesome food, especially the latter, which is so nearly akin to the marine *Mytilus edulis*,[1] although no doubt salt water does render many molluscs palatable which would not be so if taken from fresh water. It would be interesting to test this fact with *Dreissensia*, which is sometimes a marine species. *Anodonta cygnea* is said to be eaten in County Leitrim, and species of *Unio* are eaten in the south of Europe, roasted and scalloped. In China freshwater mussels are cultivated in canals as food, and in North-west Australia they form a staple article of diet.

Now let us consider for a moment those *Helices* which are not mentioned by Lovell as edible. Of these *H. arbustorum* would strike one as quite as tempting and wholesome as, for instance, *H. nemoralis*, and I find this species mentioned by Moquin-Tandon as sometimes eaten, though not much esteemed. The question of wholesome or otherwise with the mollusca depends to a great extent upon the food they have been feasting upon. For instance, molluscs sometimes feed upon the leaves of foxglove, and even the more poisonous *Atropa belladonna* is sometimes specially attractive to them as food, and if they were soon afterwards partaken of by man, the result would be serious, if not fatal. The same thing has actually occurred in the case of persons who have partaken of rabbit which has been feeding upon the last-mentioned fatal plant. A case further illustrating this point occurred a few years ago to our newly-elected President. I forwarded to him a number of *Helix pisana* from off the cliffs of Tenby, where these

1 This fact is disputed by F. Bernard (see Natural Science vol. 12 p. 4, 1898).

molluscs had probably been feeding on some poisonous plant, but unfortunately my friend who had eaten this species in Marseilles and enjoyed them there, thought he would enjoy another meal of the Tenby snails. He wrote to tell me that the result was not a happy one, as, to use his own words, "they woke me in the night to think of them, and the next morning I again remembered them."

Then, taking the remaining larger *Helices*, we have *H. cantiana*, *H. itala*, and *H. virgata*; these are all, I believe, included in continental menus, and I should have thought might be quite as palatable as other *Helices* in this country, although in order to get over the prejudice against these animals as an article of diet, a famine must, I fear, first occur.

We have now reduced our list to the four species mentioned by Lovell. The first and largest, *H. pomatia*, is to be found every day in the Parisian restaurants, and is generally and regularly eaten throughout many continental countries. I have only been able as yet to meet with one instance of this species being eaten in this country, and that was near Chedworth, in Gloucestershire, where this snail is plentiful, although it certainly appears from the whiteness and clean appearance of the animal itself, to be a far more tempting morsel than *H. aspersa*, which is eaten in many parts of England, and is regularly sold in Covent Garden and other London markets, where I have heard of its being labelled as "wall fish." Dr. Gray says "quantities of these molluscs are packed in casks and sent to the United States as delicacies. In France they are supplied to trading vessels as part of their provisions." L. E. Adams says: "*Helix aspersa* still forms an article of food in various parts of England; the taste is insipid, and the animals tough if not well boiled; as nourishing food, however, they rank with calf's foot jelly, oysters, etc." Harting states: "Snail syrup is at the present day used as a specific in all cases of cough and cold." *H. nemoralis* and *H. pisana* are both included in Lovell's edible list, and Mr. Adams tells me he has eaten both, and considers *H. nemoralis* the better of the two. Dr. Gray relates that the glass-men of Newcastle-upon-Tyne indulged in a snail feast once a year, and Rimmer in 1880 says the custom then still continued. In our Journal (Jan., 1898) is a note by Mr. P. Lawson, in which he mentions that he had then recently met a man at Teignmonth collecting land molluscs, who stated that he often made his breakfast of snails gathered in his morning walk, and that the excellence of these molluscs had only to be more widely known for them to be appreciated and valued as human food.

Lovell gives a number of receipts from old books as to how to dress, bake, boil, fry, and make a hash or soup of snails, and also

how to prepare them as medicine; these directions show how generally some of our molluscs were used for food. The following are rather quaint specimens of these recipes:—"Snales which bee in shells beat together with bay salt and mallowes, and laid to the bottomes of your feet and to the wristes of your handes, before the fit commeth, appeaseth the ague." A decoction of snails: "Take garden snails, cleansed from their shells, number twelve; red cow's milk, new, two pounds, boil to a pound; and add rose-water, an ounce, sugar-candy, half-an-ounce." For a consumption, a drink is recommended made from snails, hyssop, milk, etc., and directions given to "drink this water two or three times a day, a quarter of a pint at a time; *it has done good*"; and in another recipe, snails are to be taken prepared in broth, ten, fifteen or any "number of snails to twenty, as the person's stomach can bear with."

A clergyman has recently sent me word that he considers an application of the slime of snails as almost the only cure for eczema. A child in his village suffered fearfully from this complaint, and the mother allowed the slime of snails to be rubbed on the affected parts, and after two applications the child was perfectly cured! I can myself vouch for apparent relief having been given to the unpleasant result of midge bites, by allowing a snail to crawl over the inflamed part of the arm, as this has been tried in my own garden with a most satisfactory result. This brings me to the close of the second part of my subject, and what I have said may, I think, show that some of our slugs and snails may be of some value as human food and medicine, and I hope some of our members may experiment further to prove that these animals may be utilized so as to benefit man in this way.

III.—*As food of other animals.*

Here we have perhaps the most important uses of mollusca, especially as the principal food of many of our most valued wild animals, tame and wild birds, and fresh-water fish. A case was brought to my notice only a short time ago where two young tame pigeons which had just been feeding in a meadow were killed and their crops were found to be distended by a mass of *Limnæa truncatula*. This is a dangerous little mollusc to the farmer, as it has been proved to be the host of the Liver Fluke (*Fasciola hepatica*), the well-known internal parasite which has caused so much disease and destruction to our flocks of sheep. Whilst on the other hand, the finest mutton, according to Borlase, comes from pastures and downs where in the early mornings sheep eat with the grass the small *Helices* and other snails crawling upon it, which he states "yield a most fattening nourishment to sheep." *Helix hispida* and *Cochlicopa lubrica* have been found in the crops of young sparrows, and *H. caperata* in the crop of a wood-pigeon. Fowls and

no doubt game birds feed on *H. rufescens* and other snails, and we all know how greedily ducks feed on all molluscs and especially freshwater snails. Then again *Ancylus fluviatilis*, *Physa*, and *Valvata*, form a considerable portion of the food of the Dipper, the Moor Hen, Coot, Water Rail, and the Waders, and fish. The extent to which Thrushes feed on snails is clearly shown by "Thrush stones" (or "Thrushes' altars" as they are called), where these birds break up the shells of snails for the purpose of feeding on the animals therein. The food of the Blindworm (*Anguis fragilis*) consists almost exclusively of *Agriolimax agrestis*, and this reptile should in consequence be carefully protected, instead of being destroyed as it generally is whenever caught. The frog and other amphibians are also feeders on our small snails and slugs. A few years ago I collected a number of Natterjack Toads (*Bufo calamita*) in a wet ditch at Southport, and placed them in a tin box. The next morning I found they had disgorged a large number of *Planorbis spirorbis*, which evidently forms their staple food in that locality.

Huxley tells us that the Crayfish (*Astacus*) feeds on freshwater mollusca, eating shells and all. Molluscs also form food for the Hedgehog in his nocturnal rambles, and both the Fox and Badger are said to feed on snails and slugs when pressed by hunger. Mr. Adams, in a note in *Science Gossip*, gives his opinion that wild rabbits feed on *Helix nemoralis*, *H. aspersa*, and *H. itala*, from the piles of the shells of these molluscs which he found at the mouths of rabbit burrows on the sand dunes in Ireland, empty and apparently gnawed by the rabbits. I think it is extremely probable that rabbits do eat these molluscs as a means of obtaining moisture, as these sandhills are entirely destitute of fresh-water or succulent food.

Anodons when thrown on a bank or left high and dry are a tempting morsel to Rooks and Jackdaws, which easily make a hole in the shells with their beaks and extract the animals. On the table I have placed shells thus pierced by Rooks. Water Voles and Rats, too, feed on these molluscs, as well as *Dreissensia*, and Mr. Whitlock, in our Journal (vol. 8, p. 205) states that he has found numbers of these shells bitten all round the edges by Otters, and Mr. Harting confirms this, and gives other instances, in his "Rambles in Search of Shells," of Otters feeding on bivalves. Water Shrews find welcome food in the Sphæriidæ, and Shrews, Bank and Common Voles feed greedily on all the *Zonites* and young *Helices*, as collectors well know from the disappointment they so often experience in turning over a promising stone or log of wood, only to find the ground underneath traversed by the runs of these little mammals, and littered with the broken shells of the molluscs being sought for.

Trout and other fish all feed greedily on snails, and Jeffreys has recorded the finding of 350 shells of *Valvata piscinalis* in the stomach of a large eel. Bats have even been found feeding on *Paludina*, *Planorbis*, and *Anodonta*, but I think they must have been much pressed by hunger to do so. And, lastly, slugs are themselves cannibals, and thus assist in keeping up the balance of nature.

IV.—*As articles of merchandise, and so contributing to the wage-earning of men.*

From what I have already said under my second heading, "As food for man," it logically follows that, if they are to be consumed in any large quantities, molluscs must be gathered and collected and even reared to supply a lucrative market. So we find in France and other countries of the Continent, regular snail farms, or "Escargatoirs," at Fribourg, Dijon, Troyes, Copenhagen, and in Lorraine, Brunswick, Württemberg, and other places, where some nineteen species of snails are regularly collected and fattened for the market as being suitable for food, especially during Lent. The price of *Helix nemoralis* at Toulouse is from five to ten centimes a dish, and Moquin-Tandon purchased *H. aspersa* at fifteen centimes per hundred, and *H. nemoralis* at five centimes per hundred. *H. pisana* sells at Marseilles at about three francs per fifty kilogrammes, and the much-esteemed *H. pomatia* at one franc fifty centimes per hundred. In Paris, Harting states the daily consumption of *H. pomatia* to be 100,000, and Simmons gives the profits of a snailery near Dijon at £300 a year.

Our members will recollect Mr. Darbishire's most interesting notes in our Journal (vol. 8, p. 374) "On a Visit to a Snail Farm," wherein is described the collecting and fattening of these snails for market, where they are sold wholesale at seventeen francs per thousand for "sealed shells" (that is, when closed by an epiphragm, or false operculum for hibernation), and ten francs per thousand for open shells. They are then despatched to Paris, where they come into season with the first frost, and are boiled in their shells, and seasoned with fresh butter mixed with parsley and a little garlic. Lovell says the Parisians partake of from fifteen to twenty for breakfast, when they are said to give a better flavour to wine. I have several times tried to establish a colony of these snails in my own garden, but they have always wandered away, and the last was brought back to me last spring after an absence of three years, from a place half-a-mile distant, to reach which it must have crossed the fields and one if not two roads.

Perhaps, however, the most lucrative species of our mollusca, from a business point of view, is the pearl-producing *Unio margaritifer*. Both *Unio tumidus* and *U. pictorum* sometimes produce pearls, but

they are not of so good a colour as, and not to be compared either in size or beauty with those found in *U. margaritifer*. The pearl fishery is still carried on in the Tay and other rivers of Scotland, where this mollusc is found, and during a dry season, when the rivers are low, as much as £8 to £10 has been made weekly. In Ireland, near Derry and Waterford, and in Donegal, near Gweedore, in the Clady river, pearl shell fishery is carried on to a small extent, and at the latter place I have had pearls offered to me by the peasants of more or less value according to the clearness of the colouring. The price asked is from 10s. to £5 and more, and single pearls have been found there and sold for £20.

In the Conway river and in other rocky streams in Wales this mussel is also met with, and I can see no reason why a pearl fishery there should not pay if systematically carried on, as besides yielding pearls the empty shells of this bivalve are regularly manufactured into purses, toys, fancy work, inlaid work, and ornaments of various kinds. The Rev. J. G. Wood states that a pearl taken from the Conway river holds a place in the crown of England.

Another use for these shells is to pulverize them to give to poultry to cure the very common trouble with poultry-keepers of hens laying shell-less eggs. Shells, too, if calcined, make excellent lime, which is said to be stronger than that made from limestone. The shells of Anodons are also used as cream skimmers and sugar and flour scoops, and the valves of Unios were formerly always used by artists for holding their colours, hence the specific name *pictorum*. I have submitted thick shells of Unios found in this county to pearl button manufacturers in Birmingham, to see if they could utilize them in their trade, but they state that these shells are more brittle than those obtained from abroad, or else they would be available for manufacturing purposes. Cannot some of our chemists devise some means of overcoming this brittleness, and so give us a new industry?

I do not think it is generally known that slugs, and especially the freshwater mussel, *Dreissensia polymorpha*, are most tempting baits for Perch, Chub, Trout, Eels, and other fish.

The shells of our larger *Helices* are also used for making whistles, toys, ornamental pincushions, shell boxes, and ornaments, and I believe it is still a custom with the peasants of Bundoran and Iona to make necklaces of *Helix nemoralis* and *H. acuta*, and to sell them to tourists for threepence and fourpence each; bracelets may also be made of these shells, or of *H. itala*, forming very artistic articles of adornment. Another use of shells is that of making tooth powder by grinding them to dust; perhaps this may have arisen from Pliny's old recipe, contained in his "Natural History" (vol. 5), where he says

that "the ashes of empty snail shells, mixed with myrrh, are good for the gums, and that the grains of sand found in the horns of snails introduced into hollow teeth, relieve the pain instantly." The slime of *Helix aspersa* has also been used in making cement, which is said to have been one of the best and most durable, resisting every degree of heat and moisture, and in confirmation of this we all know how fast these molluscs attach themselves to walls or stones during hibernation. Lister says that the glutinous exudation of this snail was formerly used in bleaching wax. I doubt if all housekeepers are aware that at the present day dishonest dairymen manufacture "cream" by means of the mucous from snails squeezed into milk, which converts the latter into thick cream, but perhaps, after all, "where ignorance is bliss 'tis folly to be wise"!

The last point I will mention is the value of deformed, or sinistral, varieties of mollusca, which are so much sought after by collectors of the present day, and which command a market value only known to those who have given attention to the subject. I may say for instance that the supposed market value of a sinistral specimen of the garden snail (*H. aspersa*) is said to be a guinea, but I doubt if any are to be obtained at the present time even at that price.

I have now very imperfectly put before you some facts, in an endeavour to show that even the poor despised snails and slugs have their use and place in nature while living, and that the former may also be of some service to man when they are dead, both as food and as articles of trade and commerce. It is now for our conchologists to further investigate the life histories and uses of these animals, so that we may take advantage to the fullest extent of their benefits to man.

Limnæa peregra abandoning its Shell.—On September 20th, 1898, at Upwey, near Weymouth, I was much surprised to observe two specimens of *Lim. peregra* crawling about without their shells. The locality was a rapid shallow chalk stream of clear water, containing great numbers of rather small examples. Seeing the note by Mr. A. G. Stubbs on this question, in the October number of the Journal, suggested to me the idea of adding my own observations on this remarkable phenomenon. It is, I should imagine, almost certainly due to a disease of some sort. —K. HURLSTONE JONES, M.B., R.N., H.M.S. 'Repulse.' (*Read before the Society*, Nov. 9th, 1898).

Additional Note on Cæcilioides acicula. — Re Mr. Wright's Note on *Cæcilioides acicula* (vol. 8, p. 395), years ago when exploring a Saxon cemetery, near Witney, I found abundance of this shell on the bones of our forefathers. I suggest the burial of bones as a trap for them in places where their presence is known or suspected.—J. W. HORSLEY, St. Peter's Rectory, Walworth. (*Read before the Society*, Nov. 9th, 1898).

ADDITIONS TO "BRITISH CONCHOLOGY."

(Continued from page 138).

By. J. T. MARSHALL.

Homalogyra atomus Phil. (*continued*).

Var. **polyzona** Brus. (*Irish Nat.*, vol. 6, p. 125).—Rathlin Island, Antrim (Chaster). This differs from the type in having a sculptured periphery.

Although usually living in *Chrondus crispus* and other dwarf seaweeds, in one locality at Guernsey this species occurs plentifully under smooth stones with *Rissoa cingillus*.

H. rota F. & H.—Scilly Isles (Burkill and J.T.M.); Port Erin (Leicester)! Antrim (Chaster); Cumbrae (Robertson); Ayr Bay and Campbelltown Loch (Scott)! W. Sutherlandshire (Baillie and J.T.M.); Jersey, Guernsey, and Herm; Torbay; Killala Bay; Connemara; Eigg Island; Oban. Raised beach at Shewalton, Ayrshire (Scott)!

Even this minute shell has its dwarf form, specimens from Iona being only a quarter the size of those from Guernsey, where the largest occur.

Cæcum trachea Mont.—Lamlash Bay, Iona, Sound of Sleat, and Loch Inver (Somerville and J.T.M.); Guernsey, rare; Scilly Isles; Skegness; Connemara; Mayo; Sligo; Iona; the Minch off Loch Boisdale, 35 f., a young specimen, the furthest northern point recorded.

The concentric rings which characterise this species are of every degree of coarseness, and the shell also varies in the degree of curvature. Young shells are more *curved* and tapering, not more "convex" as misprinted in "British Conchology."

C. glabrum Mont.—From very fine sand dredged off Guernsey remarkably long and curved specimens occur, some being equal in length to two ordinary examples, and forming almost a half-circle. In this stage it is the *Brochus arcuatus* of Brown, who also made two other species of different stages of the young. The shell of the fry is at first a little flattish coil of 2-3 whorls, and then gradually lengthens out as shown in Jeffreys' figure. The young must be searched for with a microscope, and care must be taken not to confound them with the fry of *Cyclostrema serpuloïdes* with which they live, for they are remarkably alike; but the latter, though of microscopic size, are shaped like the parent, or a minute *Helix ericetorum*, whereas the baby *Cæca* are shaped like a miniature *Valvata cristata*. The drift sand from Dogs' Bay, Connemara, is peculiarly productive of this embryonic shell, but here again the fry of *Cyclostrema serpuloïdes* is equally abundant.

Turritella Lm.—The Rev. Boog Watson, writing on this genus in the 'Challenger' Report, says it has "two remarkable features which do not seem to have been noticed; the first is the system of microscopic spirals which covers the entire shell, and the second is the presence of an epidermis"; and he adds that "hardly sufficient importance seems given to the sinuation of the outer lip, which is a feature quite as distinctly marked as in *Pleurotoma*." The outer lip is very thin and brittle, and frequently imperfect, which is probably the reason why neither Jeffreys' nor Sowerby's figures exhibit the peculiar sinuation indicated by Dr. Watson; but it is obvious in a perfect adult specimen.

T. terebra var. **nivea** Jeffr.—Scilly (Smart and others); Penzance (Tregelles); Aberdeenshire (Simpson)! Torbay, 12 f.; Doggerbank, 30 f.

Var. **gracilis** Jeffr.—Milford Haven (Span)! Aberdeenshire (Simpson)! Torbay; Pembrokeshire coast; Doggerbank, 30 f.; Loch Boisdale, 30 f. An intermediate form is not uncommon.

Mr. Clark has given some very interesting details of the animal of *Turritella* in his work, in which he says it is "one of the shyest of the Gasteropoda; its locomotion is unknown to me. I have examined hundreds for hours, and never even saw it turn from one side to the other. . . . . It never protrudes the head when immersed, but entrenches itself within the operculum. . . . . I must, therefore, for the present presume that they have scarcely the power of motion, and though perhaps not bodily fixed, as in *Vermetus*, they are virtually so." Its inaptitude for motion arises from the shortness of the foot, and not from the length of the shell, as in other animals with elongated shells the progression is sufficiently active. He also adds—"The shell is singular in not having longitudinal ribs or varices, and in this respect is, I believe, only resembled by the *Aclis ascaris* and *Murex* (*Defrancia*) *teres*."[1] *Aclis supranitida*, however, must be added to the foregoing.

The egg-capsules are lodged on the whorls of the shell, singly or in small groups; they are oval in shape, with a small orifice at one end, and are attached by a short stalk. The lower whorls of the shell are invariably more loosely coiled than the upper. The Rev. R. W. J. Smart has observed *Odostomia pallida* lodged on the opercula of specimens dredged in the Shetlands.[2] It would be interesting to know if this occurs elsewhere, but the *Odostomiæ* can only be found by breaking back the shell of the *Turritella*, as the animal retires considerably within it. It also affords a home outwardly for a variety of *Calyptræa chinensis*, already noticed.

1 Brit. Mar. Test. Moll., p. 332-333, 1855.
2 New habitat for *Odostomia pallida*, *J. Conch.*, vol. 5, p. 152, 1887.

Truncatella truncatula Drap.—Jersey, Guernsey, and Sark; Torbay.

An absolutely smooth specimen is rare. Traces of the longitudinal ribs may generally be seen in the sutural groove or on the shoulders of each whorl. The immature truncated whorls, however, are always smooth.

Scalaria turtonæ Turt.—Scilly Isles, 40 f.; Doggerbank, 30 f.; Lancashire coast; Rum Island, 33 f. Guernsey specimens are much smaller and more slender.

S. communis Lm.—Jersey, Guernsey, and Herm, at low spring tides, among Zostera.

This shell is not common in a living state. Dead specimens are frequently cast ashore, but I have never known them taken alive in any number on our coasts. The Torbay form is shorter, broader, and highly coloured. I have a specimen from Liverpool Bay with the delicate ribs of *S. pseudoscalaris*, but without the encircling keel which distinguishes that species.

S. trevelyana Leach.—14 to 100 f., muddy sand. Off Peterhead, 58 f. ('Triton')! Aberdeen trawlers (Simpson)! Antrim (Chaster); Scilly, 40 f.: 30 miles off Whitby, 40 f.; Rum Island, 33 f.; Barra, 14—45 f.; West Orkneys, 45 f.; East Shetlands, 25 f.

The young of this differs from *S. clathratula* of the same size in being thicker and more conical, with fewer ribs which are angulated at the top, and a deeper suture. The operculum varies according to age, from a light horn colour in the young to almost black in the adult. My largest, from the Doggerbank, are 1¼ inches in length. I have never seen an adult specimen possessing the top whorls; they are always more or less truncated.

S. clathratula Ad.—This species is variable in its proportions; some slender individuals are only half the width of others. Jeffreys' dimensions are much too large; the usual length is 0·25 inch, though exceptional specimens from Guernsey and Laugharne have been found exceeding 0·5 inch, and it was probably one of these that constituted his type. The conditions so favourable to its growth on the Laugharne coast are shared by *S. turtonæ*, specimens thence exceeding two inches in length. A finely ribbed form, which is scarce, has double the usual number of ribs.

S. pseudoscalaris Brocchi.—Scilly, North Devon, and Pegwell Bay.[1] In the Montagu Collection in the Exeter Museum, two tablets of *S. communis* have a specimen each of this species, which most probably had a Devonian or Cornish origin. They also appear to have escaped the notice of Dr. Jeffreys, who contributed an article on

1 *J. Conch.*, vol. 5, pp. 190-192, pl. 1, f. 4, 1887.

the Montagu Collection to this Journal in 1879.[1] Both Sowerby and Jeffreys figure this species in their supplementary plates, but not well.

Cioniscus unicus Mont.—Living in sea-weeds at low-tide mark, and dredged dead down to 95 fathoms. Jersey (Duprey and J.T.M.); Scilly (Burkill and J.T.M.); Loch Boisdale, 17—70 f., and Sound of Sleat, 80—95 f. (Somerville and J.T.M.); W. Sutherlandshire (Baillie)! Sark and Herm; St. Ives; Falmouth and Helford; Skegness; Southport; Caldy Island and Tenby; Pendine; Harlech; Connemara; Mayo; Sligo; Portrush; Portmarnock; Oban, 25 f.; Vatersay Sound, Barra, 5 f.; W. Orkneys, 45 f. Raised beach at Shewalton, Ayrshire (Scott)!

I have a specimen from Jersey, 1·5 lines in length, and fragments of others which must have been two lines. Some examples are very slender.

Aclis ascaris Turt.—Jersey, Sark, and Herm; Scilly Isles; St. Ives and Porthcurnow; Eddystone; Dawlish, Torbay, and other parts of South Devon; Lancashire coast; Skegness; Connemara; Mayo; Sligo; Loch Inver, 25 f.; Dornoch Frith.

Some specimens have a decided umbilicus; others have a varicose rib on the last whorl; and in a few rare instances an example will be met with that runs very close to an immature *A. supranitida.*

A. supranitida S. Wood.—Jersey (Duprey and J.T.M.); Scilly Isles (Smart and others); Dawlish (Webster)! Jersey; Herm; Borough Island; Torbay; Babbacombe Bay; Harlech; Aberdovey; Lancashire coast, especially at Southport, where it is not uncommon with *A. ascaris*; Skegness; Mayo and Sligo; Bundoran; Portmarnock; Loch Inver, 25 f.

This pretty shell is extremely variable in size and sculpture, some specimens from the same locality being three or four times the size of others; but they are not often met with of the size given by Jeffreys. The largest I have are from Aberdovey, N. Wales, and exceed a quarter-of-an-inch in length. Jeffreys' plate figure differs from his generic one; the latter is right, but the former has the suture too deep and oblique, giving the shell a spindled appearance which it does not possess. The animal has been re-described by Jeffreys.[2]

A. walleri Jeffr.—Dornoch Frith, W. Sutherlandshire, a single specimen from shellsand; West Orkneys, 45 f. Also Atlantic off Scilly, 690 f., with var. *minor* Jeffr. (Porcupine)!

"The mouth in perfect specimens resembles that of *Pherusa gulsonæ*" (Jeffreys); but it is not sinuated to quite the same extent. The

1 *J. Conch.*, vol. 2, p. 1-4, 1879.
2 *Proc. Zool. Soc.*, May, 1884, p. 343.

more specimens of this rare mollusc that are brought to light by deep dredging, the greater appears its range of variability. My Dornoch specimen is slender, like Jeffreys' and Sowerby's figures; but in the Shetland specimens, which I consider the type, the lower whorls are broader and more convex, and the upper ones proportionally more slender. Sars gives a figure double the length of our shell, showing a lengthened cone regularly proportioned, without the pinched-up apex or the peculiar aperture; similar specimens to this were dredged by the 'Porcupine' off the coast of Portugal in 1,095 fathoms. Other specimens procured by the 'Porcupine' Expedition show a great variation in size, as in the last species, some being three times the size of British examples, with others dwindling down to the var. *minor* of Jeffreys (*A. exigua* G. O. Sars); while other forms from very deep water in the Atlantic are sculptured, some with spiral and others with longitudinal striæ. An analogous case to the latter occurs in *Cithna tenella*, which was described and is usually found to be a smooth shell, but specimens of which dredged by the 'Challenger' and 'Porcupine' were found to be more or less striated, longitudinally or spirally. I have also two specimens of another smooth species, *Pherusa gulsonæ*, from deep water in the Mediterranean, that are sculptured with two spiral striæ round the periphery and one at the base of the upper whorls.

Pherusa gulsonæ Clk.—12 to 90 f. in fine sand. Isle of Man (L.M.B.C.)! Arran Isles (Barlee); Loch Boisdale, 15 f., and Sound of Sleat, 80—90 f. (Somerville and J.T.M.); Jersey; Scilly; Land's End; Eddystone; Borough Island; Torbay; off Dawlish; Berehaven; Connemara; Iona; N. Sutherlandshire; W. Orkneys, 45 f.; Pentland Frith, 35 f. Also Vigo Bay, 20 f.; off Tangiers, 335 f.; and Pantellaria, 390 f. ('Porcupine')!

Var. **tenuicula** Jeffr.—Guernsey; Scilly Isles; St. Ives; Falmouth; Berehaven; N. Sutherlandshire; W. Orkneys; E. Shetlands.

There are three sizes of this shell—one is 0·125 inch in length, which I have from Guernsey only; the second is of the dimensions given by Jeffreys, and the third is the dwarf form *tenuicula*. Mr. Clark in his description ascribes to this species a rudimentary tooth, but I have found no sign of it in at least a hundred specimens. There is no difficulty in identifying the species so long as the aperture is perfect; it is remarkably expanded outwards, and like no other except *A. walleri*; but when broken off, to which accident it is very liable, its aspect is entirely altered, and it looks more like *Odostomia nivosa*. Immature specimens of course have not the expanded outer lip, and in this stage they very closely resemble *O. minima*, the only differences being that the latter has a more pointed apex and a more slender spire.

I do not know of any good figure of this species. Jeffreys' is bad, and badly executed, and only likely to mislead the student. Sowerby's is nothing like. Forbes and Hanley's has some resemblance to it, but it is not slender enough, and the aperture is incorrect.

Odostomia Flem.—An accurate knowledge of this difficult and prolific genus is not to be learnt or taught by the most concise descriptions or from the most accurate of plates, but by an extended experience in the examination of large numbers of specimens from various localities, and by an intimate acquaintance with them both in the field and in the study. There is no short cut to it. The difficulties of identification are caused principally by the smooth members of the genus possessing such few points of distinction, and these difficulties are enhanced not only by the presence of varieties and of intermediate and immature forms, but by those individual and sexual variations which exist in all univalve species, of having a shorter and also a more slender form than the type, as well as a longer and a shorter one, even the varieties presenting the same mutations. It is these latter, more emphasized in some species than in others, which form the groundwork of many of our named varieties, especially in the *Odostomiæ*. In some species, where the sexes are separate, this variation only indicates the male and female; but the rule will be found to obtain in all species, univalve and bivalve. (Among bivalves, this rule of variation exhibits not only a more globular and also a more depressed form than the type, but likewise a longer and a broader form). It is becoming more and more realised that to obtain a practical knowledge of any given group or species, a large number of specimens from different localities must be examined, so as to obtain the range of individual variation before generalising. No one, for example, could write with any authority on the genus *Homo* by merely examining a couple, a dozen, or a hundred examples; but the more there are examined, the more expansive becomes one's ideas of their capacities for variation up to certain definable limits.

Jeffreys' descriptions of the *Odostomiæ* are excellent, and leave nothing to be desired so far as conciseness and fulness go; but in many critical species such a close comparison of the details is necessary that they should be read side by side, which is of course impossible in a bound volume; and although in many instances the author mentions in the text the main points in which they differ, these are sometimes too short to be serviceable. The figures of the *Odostomiæ* in "British Conchology," though not badly drawn, are very badly printed, while those in "British Mollusca" are admirably drawn and printed, but do not always correctly represent the type forms—in some cases they even misrepresent them; and the same must be said

of Sowerby's "Index." Then the nomenclature of the genus shows a great poverty of resource and want of intellectual ingenuity; not only species, but their varieties are called *alba*, *albella*, *pallida*, *lactea*, etc., names that are equally applicable to almost every species and variety in the genus.

The one good and permanent character of the *Odostomiæ* is unquestionably the sinistral and inverted apex, which is constant throughout the genus, although in some littoral species, and in those frequenting rough ground, this may not be observable on account of the apical whorls being often ground down to an obtuse point. The character of the tooth is unreliable, as is also that of the umbilicus, both of which are calculated to mislead beginners; the former is often obscure or altogether absent in species characterised by a tooth, while the latter varies considerably, even in the same species when taken from one locality, from being open in some examples to a mere fissure or imperforate in others. The following notes indicate great variation in this character. Many of the *Odostomiæ*, when aged, develope a deeper umbilicus and a more or less complete peristome of the aperture, as in some species of *Rissoæ*. The umbilicus, where present, is just behind the tooth, and suggests a needle having pierced the columella and made a slight excrescence on the other side. Most of the species in the *Turbonilla* and *Eulimella* sections have the lower whorls less compact, with deeper sutural lines, as in *Turritella terebra*.

Dr. Jeffreys has remarked on the difficulty of obtaining a perfect pair of *Cardium edule*, but it is equally difficult in nearly all species, to those who possess the critical faculty, to get two specimens that shall be perfect *fac-similes*, just as it is said there are no two human beings alike, or no two leaves on a tree. The forms of the *Odostomiæ* are so varied that it would not be difficult, with large series of examples, to run one into another in regular gradation; but an accustomed eye soon learns to detect, as by instinct, the family likeness of each species. In the sculptured ones there is of course no difficulty, and the rigid observance of one form as the type is not absolutely necessary; but in the smooth species, determinable as they are principally by shape and outline, and all of them more or less minute, it is essential to have a fixed type and to adhere to it. And if the species themselves are difficult to identify, the figures even in the standard works do not help the student much, from the difficulty of determining what are the type forms. Three figures of the same species in three different works may be found to be quite unlike each other, though no doubt the authors had the same species before them.

(*To be continued*).

THE CORROSION OF SHELLS IN CABINETS.

By L. St. G. BYNE, M.Sc.

With a Prefatory Note by J. Cosmo Melvill, M.A., F.L.S.

(Read before the Society, February 8th, 1899.)

Prefatory Note.

Mr. L. St. G. Byne having requested me to give a few præfatial remarks to his paper, it is with pleasure that I comply. It was at my instigation primarily, that Mr. Byne took up the interesting and important question as to the deterioration of marine shells in public museums; and, though I cannot vouch for his having actually solved the enigma, yet he is assured that butyric acid is the cause, and this is borne out in a remarkable way by several experiments subsequently made by him. Indeed, if Mr. Byne's researches do no more than further discussion on the subject, they will have well served their purpose. Hitherto the shells of mollusca have been considered among the most enduring of created things, and a formidable vista of trouble in time to come looms before us when the possibility of the decay of "types" is considered.

I first noticed the deterioration of a *Mitra* (*Zierliana*) *ziervogeliana* in our National Collection, now many years ago and a year or two afterwards the disease had spread to another example on the same tablet. I have never had any specimen in my own collection thus attacked, excepting one, and that I fancy must have come into my possession diseased, and it was forthwith destroyed. But none of these are glued or affixed in any way to tablets, as is the case in most public museums, but are either placed loose on cotton wool, or in glass-topped boxes. I may add that I have seen too frequently in the almost hermetically-sealed drawers under the cases in the British Museum, a dulness first pervading the exterior of certain *smooth* species more markedly *e.g.*, *Conus*, *Cypræa*, and especially Naticidæ. Then grey acid efflorescence, both tasting and smelling strongly of vinegar, covers the whole surface like a powder, rising doubtless from the interior, and the specimens are soon almost irretrievably ruined. This evil being, therefore, of most serious significance, the sooner one is able to cope with it satisfactorily the better, and I am sure our best thanks are due to Mr. Byne for having been the first to take the matter in hand. J. C. M.

The subject under consideration in this paper is of the greatest importance to private collectors of Mollusca, and also to curators of museums.

I have added an Appendix, which contains purely chemical matter, being a detailed account of the experiments performed, which can if necessary be repeated by other workers. It has been a matter of regret that, with the exception of a short note by Mrs. Kenyon,[1] there is no literature to consult; and, consequently, it was doubtful what course my investigation should take.

The shells which formed the subject of my experiments were from the National Collection at South Kensington, furnished me through the courtesy and kindness of Mr. E. A. Smith. *These alone are referred to unless where otherwise distinctly stated.* The shells in the cabinet drawers are in many instances either partially or entirely destroyed, the surface being corroded and covered with a fine white powdery substance, which can easily be scraped off with a knife. This causes them to resemble Eocene mollusca.

Many species are quite unrecognisable on account of the surface being eaten away so deeply. The destruction has travelled from shell to shell and drawer to drawer, like a disease, several valuable specimens having been spoilt. The mischief has assumed large proportions, and being still on the increase, causes the greatest anxiety.

The most remarkable facts are:—

1.—Only marine species are attacked.

2.—Highly-polished shells, such as those of *Cypræa*, are the most liable to be affected.

4.—It does not extend to every specimen in a drawer, and of several mounted on the same tablet, perhaps one only is attacked.

4.—Loose shells are also destroyed, but there are comparatively few of these compared with the number of those mounted on cards.

5.—The shells affected are from twenty to fifty years old, but the corrosion does not appear until after the lapse of about ten years. The process is thus an extremely slow one.

6.—It occurs principally amongst the shells kept in drawers in the dark, where the air is confined and seldom changed.

7.—If the tongue be placed against one of the shells, an astringent alum-like taste will be observed.

We now come to the consideration of possible causes of the corrosion. They appear to me to be four in number.

I.—Damp.

If the shells were placed in a room or gallery that was not properly warmed, a very probable reason would be that a fungus had been

1 Notes on the Effects of the Atmosphere on the Shells of Mollusca, *Proc. Roy. Soc. Tasmania* for 1896, p. 88, 1897.

formed, eating away the surface of the shell. The Shell Gallery of the Natural History Museum is, I am assured, excessively dry. This cause is, therefore, excluded. It may be interesting, perhaps, to many collectors to know that in one instance practically the whole of a fine collection of mollusca in Manchester was attacked by a fungoid growth. This arose from the house being extremely damp. Removal to a drier locality and treatment with pure spirit of turpentine restored the shells to their normal condition. The turpentine was rubbed over the surface of the shell, any excess being removed with a dry cloth. The nuisance has never recurred. In no case of this sort has turpentine been known to fail in its action.

II.—Action of Sulphuric Acid.

It is well known that the atmosphere of cities contains free sulphuric acid (in addition to other sulphur compounds) derived from household fires and the burning of coal-gas. This acting over a period of years would slowly eat away the calcium carbonate of the shell, forming calcium sulphate. If this were the explanation, then the *whole* of the white powdery substance on the surface of the shell would consist of calcium sulphate. Analysis, however, showed that none was present. In order to give some idea of the amount of sulphur compounds in the air, I append some figures taken from a paper by Dr. G. H. Bailey.[1]

Sulphur Compounds expressed in Parts per Million.

Owens College, Manchester ...	clear breezy weather	...	0·1 to 0·5
Ditto	dull hazy weather, winter months	...	2 to 5
Ditto	slight fog ditto	...	2 to 10
Ditto	dense fog ditto	...	10 to 20
University College, London	ditto Dec. 22, 1890	...	30·1
St. Bartholomew's Hospital, London	dense fog Dec. 22, 1892	...	38·1
Ditto	ditto Dec. 23, 1892	...	18·9
St. George's Hospital	ditto ditto	...	15·0
Hampstead	ditto ditto	...	5·8

III.—Presence of Salt.

Shells that had not been soaked in fresh water before being placed in the cabinets would contain salt, not only in the epidermis, but also held mechanically amongst the particles of calcium carbonate It is highly probable that its presence would exert a deleterious influence.

Chemical tests showed that it was practically absent in the shells examined, a fact that occasioned some surprise.

1 Some Aspects of Town Air as compared with that of the Country, *Manchester Memoirs*, ser. 4, vol. 8, for 1893-4, p. 8, 1894.

Mrs. Kenyon, in the paper above mentioned, says:—"I had the opportunity of visiting a collection on which the near vicinity of the sea had the effect of partially destroying the enamel of the dorsal surface by streaks or clouds of a whitish or lime-like substance, the saline particles held in solution in the atmosphere evidently exerting a corroding effect in this instance." It must be pointed out that so far as we at present know, the gases which constitute our atmosphere (oxygen, nitrogen, argon, etc.) have no power to dissolve saline particles. Solid particles of salt are, however, held mechanically in minute amounts.

As the shells under consideration were not near the sea, we may dismiss this cause from our further consideration.

IV.—Action of an Acid Substance.

After carefully considering all the facts in my possession, I have come to the conclusion that the corrosion is due to the action of butyric acid.

Upon opening the box of shells sent me by Mr. E. A. Smith, I at once noticed a pungent vinegar-like odour, which pervaded the fingers and everything that came in contact with them. This pointed to the presence of acids of the acetic series. Analysis showed that every shell contained butyric acid as calcium butyrate. A few contained calcium acetate. Butyric acid is a product of the fermentation of animal matter, and its original source was found in the following manner:—A specimen of *Strombus tricornis* was soaked in distilled water for a week. A piece, about the size of a pea, of a greyish gelatinous substance was found at the bottom of the glass vessel. This had come from the interior of the shell, and chemical tests showed it to be organic matter. The shell had probably been more than twenty years in the Museum.

This at once furnished the explanation which I now bring forward, namely:—That the pieces of the animal left in the shell through insufficient cleaning or otherwise, ferment, setting free butyric acid. This substance is extremely volatile, and pervades the whole of the drawers and cabinets. The amount present can only be extremely small, but acting as it does for so many years, it slowly eats away the surface to a considerable extent, converting the calcium carbonate into calcium butyrate.

The reason that land and freshwater species are not attacked is that their epidermis acts, so to speak, as a coat of mail. Hence, highly-polished species of *Cypræa*, etc., are the most liable to corrosion through lack of such protection.

The fact that the shells exposed to daily public inspection in the top cases are less attacked is explained on the hypothesis that the light acts as a deterrent.

In one case of three shells mounted on the same tablet, only the middle one is corroded. It surely will be granted that from some yet unexplained cause some shells will be more liable to attack than others.

The question of the dryness or moisture of the room or gallery does not arise—for, according to the equation expressing the reaction, for every hundred grammes of calcium carbonate acted upon, eighteen grammes of water are set free. Moisture is thus continually supplied.

I have also come to the conclusion that the gum used in attaching the shells to the tablets has something to do with the corrosion. This is supported by the following arguments :—

1.—The majority of the shells affected in the National Collection are gummed to tablets.

2.—As far as can be ascertained, the corrosion has never occurred in private collections where the shells are, and always have been, loose.

3.—It has not occurred, so far as I am aware, in the extensive series of mollusca in the Manchester Museum. The specimens of the Swainson Collection have been for more than forty years stored there, and those of the Cholmondeley and Walton Collections not so long. The Swainson shells were formerly affixed to glass tablets, cemented with Canada Balsam, a cement that does not ferment, although its effects in other ways are prejudicial to the specimen, breaking away the epidermis, and leaving an indelible mark at the point of attachment. All shells in the above museum are, however, now loose, and placed on cotton wool in cardboard boxes with glass lids. A far different state of affairs exists, unfortunately, in another museum with which I am acquainted. The disease we are now striving to combat has existed there, unchecked and increasing, for many years, and the results are more than deplorable.

The gum ferments, acetic acid being formed. This eats away the calcium carbonate, forming calcium acetate; this latter substance was found in several of the shells examined, in addition to the calcium butyrate. Many recipes for gum contain acetic acid, which is added as a preservative. Probably some was used forty or fifty years ago at the British Museum, although I am assured that none has been used of late.

V.—Prevention.

In the case of those shells which are badly affected, nothing can be done, and their instant removal is absolutely essential, for if left they only increase the mischief with those just beginning to shew signs of corrosion. I recommend that they be soaked for twenty-four hours n a solution of corrosive sublimate (1 part in 1,000 water) and then thoroughly dried.

As an experiment *all* shells should be subjected to such a treatment, in the hope that it may prove effectual. It is quite impossible to say beforehand whether this will be an infallible remedy. Time only can prove its efficacy.

Summary.

1.—The corrosion is caused by the action of butyric acid upon the calcium carbonate of the shells.

2.—The butyric acid was derived originally from the decay of pieces of animal left in the shells.

3.—A subsidiary cause is the action of acetic acid, formed by the fermentation of the gum, used in attaching the shells to the tablets.

4.—The white powdery substance upon the surface of the affected shells consists of calcium butyrate, mixed in some cases with a little calcium acetate.

5.—In all probability treatment with corrosive sublimate solution (1 in 1,000) will prove an effectual remedy.

Appendix.

The tests are numbered consecutively for convenient reference.

I.—The fine powdery substance was scraped off with a knife, care being taken not to bring away any of the shell.

1.—A small quantity was placed in a watch-glass, and a few drops of dilute hydrochloric acid added. No effervescence took place, thus shewing calcium carbonate to be absent. A most marked smell of vinegar was evolved, pointing to the presence of acetic acid. Probably some butyric acid was also present with it.

2.—Another portion was heated strongly in a hard glass tube. Slight charring took place, owing to the presence of organic matter. An aromatic odour was given off, shewing presence of calcium salts of fatty acids (acetic and butyric).

3.—Mixed with arsenious oxide, and heated in a hard glass tube, the characteristic garlic-like odour of cacodyl, was evolved, shewing the presence of an acetate.

II.—The shells were broken into small pieces, and placed in a beaker of distilled water, the whole being left to macerate for a week.

Calcium butyrate is less soluble in hot than in cold water. In the case of a specimen of *Strombus tricornis*, a small piece of greyish gelatinous matter came from the interior of the shell. This was proved to be *organic matter* by the two following tests:—

4.—A portion was heated to redness in a porcelain basin. It charred, giving off the odour of burnt feathers.

5.—Another portion was heated in a hard glass tube, with a small piece of sodium. The tube, whilst still hot, was plunged into cold distilled water, and the whole filtered.

The filtrate was tested

(*a*) With *sodium nitroprusside*, which gave a purple coloration (sulphide).

(*b*) With *ferrous sulphate* and *ferric chloride*; on adding dilute hydrochloric acid, a blue coloration was produced, shewing the presence of a cyanide, derived from the nitrogenous matter of the piece of substance examined.

The solution obtained by the maceration of the shells was filtered, and the clear filtrate tested as follows:—

6.—A few drops of acetic acid and then ammonium oxalate solution were added. A heavy white precipitate showed the presence of much soluble calcium salt.

7.—Dilute nitric acid and silver nitrate solution were added. No precipitate showed the absence of a chloride (salt, etc.).

8.—Dilute nitric acid and barium nitrate solution were added. No precipitate was formed, showing the absence of a sulphate.

9.—Neutral solution of ferric chloride was added. A deep red coloration was produced, and on boiling a reddish-yellow precipitate was thrown down, showing the presence of an acetate.

10.—A few drops of alcohol and strong sulphuric acid were added, and the whole was warmed thoroughly. A pleasant odour was evolved, resembling that of pears. This pointed to the presence of butyric acid. In order to confirm this, a little pure butyric acid was neutralised with caustic soda and warmed with alcohol and sulphuric acid. An identical odour was evolved. There can be no doubt that the white powdery substance is calcium butyrate.

My best thanks are due to Mr. W. H. Hurtley, B.Sc., for his help in conducting these experiments, and to Mr. R. Standen for many kind suggestions.

I shall always be pleased to receive criticisms or suggestions.

8, Sea View Terrace,
Seaton, Devon.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

276th Meeting, January 11th, 1899.

Mr. Thomas Rogers in the Chair.

Donations to the Library announced and thanks voted :—

The Irish Naturalist, vol. 8, no. 1 ; the Scottish Naturalist, no. 29, Jan., 1899; the Naturalist, no. 504 ; Science Gossip, vol. 5, no. 56 ; Memoirs and Proceedings, Manchester Literary and Philosophical Society, vol. 42, part 5 ; La Feuille des Jeunes Naturalistes, ser. 3, no. 339 ; Die Opisthobranchier der Sammlung Plate, by R. Bergh ; four pamphlets on Zoological Nomenclature and Priority, by Rev. T. R. R. Stebbing ; Catalogue special, no. 1, de la Bibliothèque des Jeunes Naturalistes, 1898 ; Notes on *Cytherea* (*Tivela*) *crassatelloides* Conrad, with descriptions of many varieties, by R. E. C. Stearns ; Description of a species of *Actæon*, from the Quaternary Bluff at Spanish Bight, San Diego, California, by R. E. C. Stearns ; Check-List of Non-Marine Mollusca of South Africa, by J. C. Melvill and J. H. Ponsonby ; Variation in the shell of *Helix nemoralis* in the Lexington Va., Colony, by J. L. Horne.

Candidates Proposed for Membership.

Mr. John Edward Crowther ; Mr. C. B. Crampton.

Papers Read.

"*Limax cinereo-niger* in Carnarvonshire and Derbyshire," by Chas. Oldham.

"The occurrence of *Limnæa peregra* var. *burnetti* in Lake Windermere," by K. Hurlstone Jones.

"Additions to 'British Conchology' (*continuation*)," by J. T. Marshall.

"*Vertigo alpestris* Alder in Lancashire, " by R. Standen.

Exhibits.

By Mr. J. D. Dean : An interesting collection of marine shells, from Cheefoo, China, which, although mainly beach shells, included some very fine examples of *Cancellaria spengleriana*, *Soletellina japonica*, and others.

By Mr. K. Hurlstone Jones : A fine series of European land shells, including *Helix aspersa* varr. *unicolor* and *zonata* ; *H. marmorata* and var. *alba* ; *H. lactea* and var. *grisea*, *H. pisana*, *H. conspurcata*, *H. lens*, *H. apicina* ; *Hyalinia helvetica* ; *Rumina decollata* ; and *H. acuta*, from Gibraltar. *Cionella reissi* ; *Helix conoidea*, *H. lanuginosa*, and varieties of *H. pisana*, *H. virgata*, and *H. lactea*, from Algeciras. *Helix aspersa* var. *unicolor* ; and varieties of *H. nemoralis*, from Arosa Bay. Also a beautiful set of *Helix hortensis*, from Osmington, Dorset, shewing transitional colour gradations between varr. *incarnata*, *lilacina*, *olivacea*, and *lutea* ; a subscalariform specimen of *H. aspersa*, and examples of 'repaired' shells from Dorset ; a scalariform *H. virgata*, from Upover, Dorset ; *Limnæa peregra* var. *burnetti*, from Loch Skene, and what he believed to be the same variety from Lake Windermere—but this may prove to be an intermediate form between the var. *lacustris* and the true *burnetti*, which latter it resembles in the peculiar intortion of the spire, but is more angled at the shoulder of the whorls.

A large number of duplicates collected by Mr. Jones at Gibraltar and Algeciras were distributed amongst the members present.

By Mr. R. Standen : *Vertigo alpestris* Alder, from the Roughlee Valley, Pendle Forest ; and a choice series, from the Gulf of California, of *Erato vitellina*, *E. columbella*, *Pustularia pustulata*, *Trivia pulla*, *T. radians*, *T. sanguinea*, *T. californica*, and *Pedicularia californica*.

By Mr. R. D. Darbishire : *Pedicularia sicula* and varieties, from the coralline zone, Messina, and elsewhere in the Mediterranean.

277th Meeting, February 8th, 1899.

Mr. J. Cosmo Melvill in the Chair.

Donations to the Library announced and thanks voted :—

The Irish Naturalist, vol. 8, no. 2; the Naturalist, no. 505; Science Gossip, vol. 5, no. 57; Journal of Malacology, vol. 7, no. 1; Feuille des Jeunes Naturalistes, ser. 3, no. 340; the Nautilus, vol. 12, no. 9; Journal of Applied Microscopy, vol. 1, no. 11.

Donation to Cabinet announced and thanks voted :—

Clausilia semidenticulata Pfr., from Asia Minor, by Mr. J. Bliss.

New Members Elected.

Mr. John Edward Crowther, Portland Street, Elland.

Mr. Cecil B. Crampton, M.B., C.M., 17, Parsonage Rd., Withington, Manchester.

Candidates Proposed for Membership.

Mr. T. A. Appleton; Mr. H. Brooksbank; Mr. A. E. Wilson.

Resignation of Member.

Miss J. E. Linter.

Papers Read.

"Corrosion of Shells in Cabinets," by L. St. G. Byne, with a Prefatory Note by J. Cosmo Melvill.

"*Vertigo pusilla* Müller in Lancashire and Westmorland," by R. Standen.

Exhibits.

By Mr. J. C. Melvill: Two beautiful specimens of *Cochlostyla damahoyi* Pfr., one of them being the type, from the collection of the late Mr. Patrick Dalmahoy, W.S., of Edinburgh, who died in 1873. This specimen was procured at the sale of Mr. Dalmahoy's effects on Oct. 10th, 1873, at Stevens' Auction Rooms. Mr. Melvill drew attention to the erroneous spelling of the specific name by Pfeiffer (*Proc. Zool. Soc.*, 1856, p. 328), which has been copied by Paetel, Clessin, Tryon, and others, and which ought to be '*dalmahoyi*,' instead of '*damahoyi*.'

By Mr. Thomas Rogers: Specimens of *Pararhytida dictyoides* Pfr., from New Caledonia; *Chlorites rehsei* von Marts., and *Papuina brumeriensis* Forbes, New Guinea; and *Papuina ramsdeni* Angas, Solomon Islands.

By Mr. Edward Collier: *Physa heterostropha* Say, taken near Birmingham; and *Clausilia perversa* var. *albina* from Barnt Green, Worcestershire.

By Mr. R. Standen: *Vertigo pusilla*, from new localities in Lancashire and Westmorland (exhibited on behalf of Mr. A. W. R. Röberts); *Pyramidula cockerelli* Pils.; *Polygyra rhyssa* Dall; and *Polygyra ashmuni* Dall, New Mexico.

A series of diseased shells from various collections, private and public, was shown in illustration of Mr. Byne's paper.

278th Meeting, March 8th, 1899.

Mr. J. Cosmo Melvill in the Chair.

Donations to the Library announced and thanks voted :—

The Irish Naturalist, vol. 8, no. 3; the Mollusca of Dorsetshire, by J. C. Mansel-Pleydell (*from the author*); the Nautilus, vol. 12, no. 10; Journal de Conchyliologie, vol. 46, no. 2; the Naturalist, no. 506; Science Gossip, vol. 5, no. 58; La Feuille des Jeunes Naturalistes, ser. 3, no. 341.

New Members Elected.

Thos. Alfred Appleton, M.R.C.S., L.S.A., 46, Britannia Rd., Fulham, S.W.

Hugh Brooksbank, M.B., B.C., B.A., College Road, Windermere.

Arthur Ernest Wilson, 228, Victoria Street, Grimsby.

Candidates Proposed for Membership.

Mrs. Blundell ; Mrs. Smith ; Mr. G. E. Mason ; Mr. G. M. Morris ; Mr. J. E. Neild.

Papers Read.

"*Herviera*, a new genus of Pyramidellidæ," by J. Cosmo Melvill and R. Standen.

"A contribution towards a list of the Marine Mollusca of Tenby and neighbourhood," by Bartlet Span.

Exhibits.

By Mr. J. C. Melvill : *Pyramidella glans* Rve., *Odostomia lævis* Ang., *Turbonilla templaris* Melv., *Pyrgulina casta* Ads., *Parthenia kreffti* Ang., *Syrnola elegans* Ads., and *S. karachiensis* Melv., to illustrate the paper on *Herviera*.

By Mr. Bartlet Span : A fine series of British marine mollusca, illustrating the more important species and varieties mentioned in his paper on "The marine mollusca of Tenby."

By Mr. E. C. Stump : Some very beautiful and unusual varieties of *Cypræa decipiens* Smith, from West Australia.

Note on Scalaria fimbriolata Melv.—Two specimens of this exquisite *Scalaria* were dredged by Mr. F. W. Townsend in the same region (Persian Gulf) as the type, which is now in the British Museum. The additional material thus to hand tends to confirm the distinctness of this mollusk from its nearest congener *S. decussata* Kien. (=*S. kieneri* Weink.), the lamellæ being closer, finer, and more fimbriolate, the upper portion of the whorls straighter, leaving a narrow, pseudo-canaliculate suture. The second and larger example, 52 mm. long, was found off Sheik Shuaib I., the third off Maskat. Its occurrence is, therefore, probably general at the entrance to the gulf. *S. decussata* also occurred, found at fifteen fathoms, by Capt. Tindall of the S.S. 'Patrick Stewart,' off the Angrias Banks, west of Bombay, he having dredged there at Mr. Townsend's request. Probably the large example will soon be in the British Museum ; the third specimen has been lately presented to Mr. Melvill by Mr. Townsend. Another exceedingly beautiful, though small, *Scalaria* has also been discovered by Mr. Townsend, dredged in fifteen fathoms, off Malcolm Inlet, Persian Gulf, and has been recently described as *S. malcolmensis* Melv. It will be placed in sequence next to *S. dianæ*, which is, however, a more extraordinary shell still, both, however, agreeing in the uniform, triangular lamellæ, more closely set in the new species and not projecting at so wide an angle. Of this two examples occurred.—J. Cosmo Melvill (*Read before the Society*, March 9th, 1898.

Vertigo pusilla Müller **in Lancashire and Westmorland.**—An interesting series of *V. pusilla*, which I exhibit on behalf of Mr. A. W. Rymer Roberts, is particularly noteworthy by reason of its adding another to our meagre list of Lancashire localities, together with no fewer than four separate records for Westmorland, from which county it has not been previously reported by those conchologists who have investigated the molluscan fauna of the Lake district. All the localities are near Lake Windermere, the Lancashire one being Ferry, and the others Calgarth, Ellery Bank, Rayrigg, and St. Catharine's. The shells were collected in fair numbers during 1897-98, and are of precisely the same type as those from Silverdale and Grange-over-Sands (see p. 113 of this volume).—R. Standen (*Read before the Society*, February 8, 1899).

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"The Mollusca of Dorsetshire (marine, estuarine, freshwater, and land) and the Brachiopoda," by J. C. MANSEL-PLEYDELL. Dorchester, 1898.

We hail the appearance of this concise and well-arranged county hand-book with unusual satisfaction. It is, we trust, the pioneer of many similar catalogues, compiled on the plan of our best local floras. It is dedicated to Mr. E. Ruthven Sykes, who has ably assisted the author in the bibliography and nomenclature, adding much to the value of the work.

We should, however, like to take the opportunity of enquiring about one or two knotty points, on which it might be well to invite discussion.

Are adjectival names, *e.g.*, *Polita*, *Vitrea*, *Retusa*, *Arctica*, even though upheld by the law of priority, to be allowed to stand, or does their retention not violate one of the primary canons of nomenclature?

Is not *Pyramidula* Fitz. too near *Pyramidella* Lam. ? Is not *Aula* Brug., 1789, antedated by *Amphiperas* Gronov., 1781 ; must not *Aporrhais* Aldrov. (red. in syn.) fall before *Chenopus* Phil.; and is not *Ptychina* Phil. far more recent than either *Axinus* J. Sowb., 1821, or *Cryptodon* Turt., 1822?

We only note one omission of any importance, that of *Vertigo moulinsiana* Dup., which was recorded by Mr. R. Standen (*J. Conch.*, vol. 6, p. 348, 1891), as occurring in 1889-90 at Morden, Dorset, in large quantity.

One other point: *Helix*, we note, is rightly sub-divided according to Smith and Pilsbry's views. Why are not certain other genera, *e.g.*, *Nassa* and *Rissoia* so treated? As the author says in his preface, much requires to be done with regard to the latter genus, and yet certain sub-genera (or genera) are recognised almost universally, and fairly well defined.

But all these are only minor points, and which in nowise detract from the value of the work, and from our great admiration of the thoroughness and zeal with which Mr. Mansel-Pleydell has completed his task, again placing under much obligation to him not only the naturalists of Dorsetshire, but of all English counties.

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acters], by H. A. PILSBRY and W. J. RAYMOND. "Nomenclature of some African land-shells" [*Ennea microstoma*, *Vertigo thaumasta*, *Curvella* has precedence of *Hapalus* and *Fauxulus* of *Faula*], by C. F. ANCEY.

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Helices climbing in dry weather.—On the 23rd September, at the end of almost a month's extremely dry weather, when everything was brown and parched, I was surprised to see numerous specimens of *Helix hortensis*, *H. aspersa*, and *H. rufescens* at considerable elevations on a hedge at Wyke near Weymouth. The molluscs were exposed to the full glare of the afternoon sun, and had retired far within their shells. Many of them were ten and twelve feet from the ground. They were adherent by dried mucus to the leaves and twigs. *H. virgata* I also noticed had climbed to the tops of the stalks and blades of grass in the same vicinity. That the above-mentioned species often climb high in the hedges in wet weather I am well aware, but I have not before noticed the tendency to do so when it is very dry. I imagine the object of the molluscs is to obtain the fullest benefit of the heavy dew, which is especially deposited on leaves, grass-blades, and other projecting objects.—K. HURLSTONE JONES, M.B., R.N., H.M.S. 'Repulse.' (*Read before the Society*, Nov. 9th, 1898).

HERVIERA, A NEW GENUS OF PYRAMIDELLIDÆ.

By JAMES COSMO MELVILL, M.A., F.L.S., and ROBERT STANDEN.

(Read before the Society, March 8, 1899).

Amongst the marine mollusca described by us in October, 1896, from the Loyalty Islands, was a very erratic member of the Pyramidellidæ, which, with considerable diffidence, we provisionally placed in the genus *Pyrgulina*, under the name *P. gliriella*. This was a very minute, obtusely-oval, rather solid shell, thickly ribbed longitudinally, purplish pink in colour, and superficially much like *Zafra pupoidea* A. Ad. in miniature, but with the aperture oval, peristome continuous, thickened, columella strongly uniplicate.

Another species, to be described below, having recently come to hand, prompted us to examine the original type more closely, and we now decide that it is necessary to propose a new genus for their reception, as follows:—

Herviera, gen. nov.

Testa minuta, ovata vel oblonga, obesa vel attenuata, solidiuscula, perlævis, nitida, violacea, punicea, vel brunneo-tincta; anfractus sex vel septem, quorum apicales $1\frac{1}{2}$ *vel* 2, *heterostrophi, vitrei, globulares, colorati, nitentes; cæteri apud suturas compressi, ventricosuli, longitudinaliter arcté costati; costæ simul ac interstitiæ perlæves; apertura ovata; peristoma continuum, incrassatum; columella fortiter uniplicata; plica obliqua.*

Shell, minute, ovate or oblong, stout or attenuate, somewhat solid, very smooth, shining; in colour tinged with either violet, pink, or brown; six or seven whorled, the apical whorls being one-and-a-half or two in number, and heterostrophic, glassy, globular, very shining, and coloured as in the body of the shell; the remainder of the whorls are compressed suturally, and inclined to be tumid; longitudinally they are closely smoothly ribbed, the ribs in one of the species at least having a glazed appearance as of vitreous enamel; they are thick in proportion, and their interstices are perfectly smooth likewise. Aperture ovate, peristome continuous, thickened, coloured; the columella strongly once plicate, the plait being oblique.

Type: **H. gliriella.** (*Pyrgulina gliriella* Melv. and Stand., *J. of Conch.*, vol. 8, p. 303, pl. 10, f. 57, October, 1896).

Hab.: Lifu and Uvea (Hadfield), New Caledonia (C. Hedley).

In comparison with its nearest allies, this new genus in substance and general form somewhat resembles a very diminutive *Pyramidella glans* Reeve, but the small size and single columellar plait and absence of interstitial pitting at once distinguish it. *Syrnola* Ad. possesses an uniplicate columella, but the whorls are smooth and ribless, and

general form quite dissimilar. *Elusa* is turriculate, and attenuately fusiform; *Mormula*, rissoid, and scarcely plicate, though like *Herviera* in solidarity, and to some extent, in the longitudinal costæ. From any of the *Odostomiæ*, inclusive of *Pyrgulina*, *Parthenia*, *Chrysallida*, *Mumiola*, etc., it amply differs in the characteristic thickened substance of the shell, in coloration, in the absence of any decussating striæ, in continuous peristome, and peculiar columellar plait, though in general form it resembles certain *Pyrgulinæ*.

We have much pleasure in being able to dedicate this genus to one who is so successfully investigating the molluscan fauna of the Loyalty Islands, and is publishing from time to time in the pages of the *Journal de Conchyliologie* admirable descriptions, which have been and are of such signal service to us, the Abbé Joseph Hervier, S.J. of St. Etienne, Loire, France.

The second species of the genus is now to be described as follows:—

Herviera isidella sp. nov.

H. testa oblongo-fusiformi, multum attenuata, pallide puniceo-brunnea, solidiuscula, lævi, nitida; anfractibus septem, apicali incluso pervitreo, pellucido, dorsaliter heterostropho et retorto; apud suturas impressis, ventricosulis, undique longitudinaliter arcté recticostatis; costis, ut in typo (H. gliriellâ) perlævibus, nitidis, interstitialiter lævissimis; apertura parva, ovata; peristomate paullum incrassato, continuo; columella uniplicata, plica obliqua. Long., 3 *mm.*; *Lat.*, 1 *mm.*

Hab.: Uvea, Loyalty Islands, New Caledonia.

Herviera isidella, × 8.

Two examples of a species much resembling the type in substance and general characteristics of sculpture, but of far more graceful form, being attenuate, oblong fusiform, of a pale pinky brown hue, somewhat solid, smooth, shining. Inclusive of the bulbous, pellucid, smooth glassy-brown apical whorl, dorsally retrorse, the whorls are seven in number, and are suturally impressed, somewhat tumid, and uniformly straightly ribbed, the costæ being rather thick, smooth, and close, the interstices likewise smooth. The aperture is somewhat small, ovate; peristome thickish, continuous; columella once plaited; plait oblique, but not so pronounced as is that of the typical species.

The likeness, in miniature, of the whorls to the longitudinally ribbed jointed sections of the well known Alcyonarian (*Isis hippuris* L.) suggested the trivial name.

THE LAND AND FRESHWATER MOLLUSCA OF SOMERSETSHIRE.

By E. W. SWANTON.

(Read before the Society, Nov. 9th, 1898).

THIRTY-EIGHT years have passed away since the appearance of the only complete list—as far as we know—of the Land and Freshwater Mollusca of Somersetshire (60).[1] Many local lists have been published since that time (see Bibliography, at end), of which free use has been made in compiling this catalogue. In the nomenclature I have followed Collinge's "Catalogue of British Slugs," and the "List of British Land and Freshwater Mollusca" published by the Conchological Society in 1892.

An asterisk preceding a species denotes its omission for Somerset in the latest census list, as given in the second edition of Lionel E. Adams' "Manual."

Without the assistance of many kind friends this list could not have been compiled, and I here take the opportunity of thanking them; more especially Mr. Wm. Bidgood, of the Taunton Museum, for kind loan of books; the late Mr. Edward Wilson, of the Bristol Museum, for much useful information respecting his beautifully mounted collection of local shells; also Messrs. W. Herridge, C. D. Heginbotham, E. W. Bowell, and many others whose name are duly appended to records made by them.

Arion ater L.—Generally distributed.

Var. **lamarcki** Kal. (=**ruber** Moq.).—Bratton St. Maur.

Var. **violescens** Mge.—Weston-super-Mare.

Var. **alba** Fér.—Gardens at the foot of West Hill, Wincanton (W. Herridge). Last year I took a very beautiful variety from a hedge in a lane at Stoke Trister, near Wincanton. Ground colour yellowish-white, lineoles of a vivid orange, a broad black band extended the whole length of the back, mouth and tentacles being also black.

Var. **reticulata** Roeb.—One example from Hatch Beauchamp, near Taunton (Bowell).

* **A. subfuscus** Drap., 1805.—Somewhat abundant in the woods and hedgerows of the eastern part of the county. It is the *Arion flavus* Müller mentioned by Norman (60) as having been taken "among the ruins of Walton Old Church, and likewise in Brockley Coombe"; and is doubtless generally distributed. Woods at Butleigh, near Glastonbury; Hatch Beauchamp, Taunton, "under stones beneath *Pinus sylvestris*" (Bowell).

1 The numbers in heavy type refer to the Bibliography at the end of the paper.

Var. **krynicki** Kal., 1851, sub-v. *griseus* Collinge.—Feeding on gorse-bloom, on Bratton Hill, near Wincanton.

A. hortensis Fér., 1819.—A very common species throughout the county.

Var. **cæruleus** Cllge.—Bratton St. Maur, frequent.

***A. fasciatus** Nilsson, 1822 (=**A. circumscriptus** Johnston, 1828, = **A. bourguignati** Mabille, 1868).—Not so abundant as the preceding species, but apparently evenly distributed.

***A. minimus** Simroth.—In all probability common, but often confounded with immature forms of *Arion ater*. It should be noted that the rugosities in this species consist of small pointed projections, arranged in symmetrical rows, whilst those of *A. ater* are long and irregular; moreover *A. minimus* has lateral bands, which are never present in *A. ater*. It is common in the district around Wincanton, and I have also observed it at West Pennard, near Glastonbury.

* **Limax maximus** L.—Very common. Norman says of this species:—"The striped and spotted varieties are common. We met with a variety in Cleve Coombe remarkably distinct, and we believe hitherto unrecorded. It was altogether pitchy black, without spot or markings of any kind, and fully six inches long."

Var. **maculata** Leach, 1820 (Norman's spotted variety).—Bratton St. Maur, abundant; Bath (Mrs. Oldroyd); Hatch Beauchamp (Bowell).

Var. **cellaria** D'Arg. (Norman's striped variety).—Bratton St. Maur, common.

Var. **lilacina** Roeb., 1884.—Hatch Beauchamp (Bowell).

Var. **fasciata** Raz., 1789.—Bratton St. Maur. The "pitchy black" form of Norman may doubtless be referred to *L. cinereo-niger* Wolf in Sturm. 1805, var. *niger* Moquin-Tandon. It may here be remarked that *L. cinereo-niger* has no claim to specific rank, being only a variety of the above species.

L. marginatus Müll., 1774 (=**L. arborum** Bouch., 1838).—Fairly well distributed. "On trees and rocks in Goblin, Cleeve, and Brockley Coombes, and some of the glens running up into the Mendips, near Wells" (Norman); general, in the Bristol district (Cundall); "Very common in the woods around Hatch Park, near Taunton" (Bowell); Coombe Down, Bath (Mrs. Oldroyd); Lily Wood, Bratton St. Maur, and Milton Clevedon.

Amalia sowerbyi Fér., 1823 (= **Limax marginatus** Jeffr.).—A very local species. Bath (Mrs. Oldroyd); "somewhat sparingly at Hatch Beauchamp, more common at Beer Crowcombe, an adjacent village" (Bowell); "at Clevedon in gardens, and in the copse between the Upper Clevedon and the beach" (Norman).

Agriolimax agrestis L.—The most abundant of our slugs.

Var. **sylvatica** Moq.—Bratton St. Maur.

Var. **nigra** Morelet.—Bratton St. Maur; Glastonbury.[1]

Var. **grisea** Ckll.—Shepton Montague.

Var. **punctata** Picard.—Hatch Beauchamp (Bowell).

***A. lævis** Müll., 1774 (= **Limax brunneus** Drap., 1801).—A somewhat local species. "Among heaps of stones by the side of the lane which runs parallel with the cliff from Walton to Portishead, and among decaying vegetation by the side of a rhine in Portishead Moor" (Norman); Coombe Down, Bath (Mrs. Oldroyd); in damp situations, Bratton St. Maur; "Not uncommon by a ditch, Hatch Beauchamp" (Bowell).

Testacella maugei Fér., 1819.—Introduced with foreign plants, therefore very local. There are examples in the Jenyns Collection of land and freshwater mollusca in the Bath Museum; doubtless these were taken in the district, and others in the Bristol Museum, which Mr. Wilson tells me were taken at Long Ashton. We have also had examples taken from a nursery garden at Castle Cary. The remarks on this species as given in Norman's list are so interesting that we here give them in full:—"Forty-six years ago this most interesting mollusk was found in what were then Messrs. Sweet and Miller's, but which are now Messrs. Jaraway and May's, nursery grounds at Clifton. From that time to the present it has thriven and propagated freely in its original locality, and has likewise been introduced with plants into many other gardens in the west of England. In this way it has established itself at Bath, at Buslington, at Clevedon (in the gardens of Sir Arthur Elton and those of Lee), and at Taunton, and thus may be considered to have made good its claim for admission into our list of British mollusca."

Vitrina pellucida Müll.—"Widely distributed but not abundant" (Norman). Mr. Bowell writes: "Not very common at Hatch Beauchamp, near Taunton. Largest specimen measured alt. 3·8 mm., breadth 6·7 mm., but the variation is not constant = var. *major* Fér.?" It is common and frequent in the Wincanton district. There are typical specimens in the Jenyns Collection in the Bath Museum, and others from Long Ashton in the Bristol Museum.

Hyalinia polita Held.—A common species. "Common among damp heaps of stones and moss in woods; very fine in Brockley Coombe" (Norman). Possibly the 'very fine' specimens were *Hyalinia draparnaldi* Beck, for this species occurs in the neighbourhood

1 Invariably occurs under pieces of wood in damp situations, near to buildings, sheds, etc. I have never observed it in any other habitat.

of Bristol, there being examples in the museum labelled 'Clifton.' The Jenyns Collection at Bath contains some fine typical examples.

Var. **albina** Moq.—Bath (Mrs. Oldroyd); Holbrooke, Bratton St. Maur (E.W.S.).

***H. glabra** Studer.—Apparently a very local and rare species. I have a few specimens taken on Creech Hill, near Bruton; and Mr. Bowell records from Hatch Beauchamp "a small form, not rare, alt. 4·1 mm., breadth 8·0 mm."

Hyalinia alliaria Miller.—"Common in woods, on hedge banks, and under stones" (Norman); Leigh Woods and Portishead (Cundall); near Wincanton and Creech Hill, Bruton (E.W.S.); Combe Down, Bath (Mrs. Oldroyd). Specimens in the Jenyns Collection.

Hyalinia nitidula Drap.—"In similar situations to the last, and like it, very common among decaying beech leaves" (Norman); Leigh Woods, Bristol (Cundall); Bristol Museum Coll., Wilson; Creech Hill, Bruton, and Penselwood (E.W.S.); Bath (Mrs. Oldroyd). Type examples in the Jenyns Coll.; Rejectamenta of the River Brue, Castle Cary (E.W.S.); Hatch Beauchamp, Taunton, very common, and frequently attaining a large size. Al., 5·4 mm.; Br., 10·3 mm. (Bowell).

Var. **helmii** Alder.—Abbots Leigh (Bristol Mus. Coll.); Penselwood (E.W.S.).

Hyalinia pura Alder.—A local species. "Among rotting leaves at the foot of Elson Hill, Clevedon; at Wrington, near Wells; and in Brockeley Coombe" Norman; Leigh Woods, Bristol (Cundall). "Common in woods at Hatch Beauchamp" (Bowell); Rejectmenta of the Brue, Castle Cary (E.W.S.). Specimens in the Jenyns Collection, Bath Museum.

Hyalinia radiatula Alder.—A rare species. "At roots of stunted grass, growing in the crevices of limestone rocks on Elson Hill, and in similar situations on the eastern scarp of Clevedon Hill" Norman); Leigh Woods Bristol (Cundall); Jenyns Coll., Bath.

Hyalinia crystallina Müll.—Commonly found throughout the county amidst decaying leaves and moss. There are typical examples in the Bristol Museum, also in Jenyns Collection, Bath.

Var. **complanta** Jeff.—Leigh Woods, Bristol (Jeffreys).

***Hyalinia fulva** Müll.—Local; frequenting damp situations. Bath (Jenyns Coll.); Long Ashton (Bristol Mus.); Leigh Woods (Cundall); Wincanton and district (E.W.S.); Hatch Beauchamp, not frequent (Bowell); Brockley Coombe and near Wells. "Small; under stones lying among grass on Elton Hill, Clevedon; and among rushes in Walton Moor" (Norman). Might Norman's "small" form

be referred to the variety *Mortoni*, Jeffr., recorded (without precise locality) for Somerset, by Cundall and Rimmer?

Hyalinia nitida Müll.—Given in the last census list for Co. No. 6, Somerset N. Locality? Apparently a rare species. We have two or three bleached specimens picked out from the rejectmenta of the stream at Shepton Montague, at a point immediately below Redlynch Park, April, 1897.

Helix rotundata Müll.—Very common. Bath (Jenyns Coll.); Abbotts Leigh (Bristol Mus.).

Var. **rufula** Moq.—Bratton St. Maur, rare (E.W.S.).

Var. **turtoni** Flem.—Bristol (Jeffr.); Bath (Mrs. Oldroyd); rejectmenta of valley streams at Bratton St. Maur and Shepton Montague (E.W.S.).

Var. **alba** Moq.—Clevedon (Norman); Bratton St. Maur (E.W.S.); "Hatch Beauchamp. Five specimems, an under-sized race. Diam. = 6 mm." (Bowell).

Var. **pyramidalis** Jeffr.—Bristol (McMurtrie).

Helix rupestris Drap.—Common on walls and exposed situations in most parts of the county. "Common in the crevices of limestone rocks at Clevedon and Elton Hills, Cleeve Foot, Wrington Hill, Cheddar Cliffs, etc., and often exceedingly abundant among the rotten mortar of old walls as behind the Royal Hotel at Clevedon, and in many spots on the Mendips" (Norman, as *H. umbilicata*, Montague).

***Helix pygmæa** Drap.—Apparently an uncommon species, but so minute a shell is doubtless often overlooked. Wincanton district, uncommon (E.W.S.); Hatch Beauchamp, one specimen (Bowell); Ashley Hill, Bristol; Bath (Jenyns Coll.). "At roots of grass on Clevedon and Elton Hills. Not common" (Norman).

***Helix aculeata** Miller.—A local species. Claverton Down, Bath (Clark); Jenyns Coll.; Hatch Beauchamp, common (Bowell). "Under bark of a fallen tree in Brockley Combe" (Norman); Leigh Woods (Cundall); "Creech Hill, Bruton; woods at Holbrooke, near Wincanton. Very abundant in rejectamenta of River Brue at Castle Cary, and streams at Bratton St. Maur and Shepton Montague" (E.W.S.).

Var. **albida** Jeffr.—Bath (Clark).

Helix pulchella Müller.—Generally distributed.

Var. **costata** Müller.—Wincanton; rejectamenta of Brue at Castle Cary (E.W.S.); Abbots Leigh (Bristol Museum Coll.); near Tickenham (Norman); Coombe Down, Bath (Mrs. Oldroyd).

Helix lapicida Linn.—A well distributed species. Bath (Mrs. Oldroyd); Jenyns Coll.; Leigh Woods (Cundall); Abbots Leigh (Bristol Mus.). "Common, but confined apparently to the limestone rocks, near Wells, Cheddar, Wrington, Clevedon, and Elton Hill; Cadbury Hill, Yatton; Cleeve Foot, Axbridge, etc." (Norman); Taunton (Bowell). "Wincanton, Glastonbury, hills around Milton Clevedon" (E.W.S.).

Var. **nigrescens** Taylor.—Bristol (Bristol Mus.); Bratton St. Maur and Wincanton (E.W.S.).

Var. **minor** Moq.—Specimens approaching this form from Bratton St. Maur.

Var. **depressa** n. var. — Apex of shell much depressed. Bratton St. Maur, rare.

Helix aspersa Müll.—Abundant everywhere. This species is much sought after in the winter months by men from Bristol, who collect and sell them by the gallon to fishmongers. (See *Naturalists' Chronicle*, Jan. & Feb., 1897).

Var. **conoidea** Pic.—General in hedges (Cundall); Bratton St. Maur. Not common.

Var. **globosa** Moq.—One example from a hedge bank near Pitcombe Rectory.

Var. **minor** Moq.—Bristol (Mus. Coll.); Bratton St. Maur, frequent.

Var. **nigrescens**, Moq.—Occasionally with the type in hedge-banks. Bratton St. Maur.

Var. **maxima** Taylor.—An exceedingly fine specimen from a hedge; Bratton St. Maur. We regret not having taken measurements (have since given it away). It was quite as large as a full-grown *H. pomatia*, and altogether stout. In colour approaching the *nigrescens* form.

Var. **grisea** Moq.—Coombe Down, Bath (Mrs. Oldroyd); Leigh Woods, Bristol (Bristol Mus.).

Var. **unicolor** Moq.—"An unicolorous specimen (not *exalbida*, Menke) from Hatch Beauchamp, near Taunton" (Bowell).

Var. **albo-fasciata** Jeffr.—Near Bristol (Bristol Mus.); Bratton St. Maur; hedge-banks, near the Cross Roads, tolerably common.

Var. **exalbida** Menke.—Evidently very local, but always abundant where it occurs. Near Bristol (Bristol Mus.); Cuckoo Hill, near Bruton (Heginbotham); Cannington, near Bridgewater; the Cross Roads, known as "Jack White's Gibbet"; Bratton St. Maur.

Var. **tenuior** Shutll.—Bratton St. Maur; rare.

Var. **zonata** Moq.—Bratton St. Maur and district.

Var. **undulata** Moq.—Holbrooke, near Wincanton.

Monst. **sinistrorsum** Hele.—Clevedon (Norman).

Monst. **cornucopia** Gmelin (= Monst. *scalariforme* Taylor).—Bath (Mrs. Oldroyd).

Monst. **subscalariforme** Williams.[1]—Doubtless the following may be referred to this monstrosity. "Examples upon the cliffs towards Ladies' Bay, Clevedon, have the spire produced so that the shell assumes the form of *Paludina viviparus*" (Norman).

Helix nemoralis L.—Generally distributed, especially abundant on the sand dunes of the coast about Burnham.

Var. **roseolabiata** Taylor.—An extremely local form, evidently referred to by Norman in the sentence—"We have met with a rare variety at Wells, which is orange, with five pale yellow bands, and has the lip and throat peach-coloured."

Var. **bimarginata** V. Marts.—One example from Abbott's Hill, Bratton St. Maur.

Var. **castanea** Moq.—Bristol (Bristol Mus.); Bath (Mrs. Oldroyd); Hatch Beauchamp (Bowell); Milton Clevedon and around Bruton (Heginbotham); Bratton St. Maur, abundant in gorse on hill sides (Herridge); sand hills, Burnham, abundant.

Var. **carnea** Rbk. & Tylr.—Burnham; Milton Clevedon, near Bruton; Lilly Wood, Bratton St. Maur.

Var. **rubella** Moq.—A very frequent form. Bath (Mrs. Oldroyd); Weston-super-Mare; Burnham sand dunes; gorse at Bratton St. Maur; hillsides at Milton Clevedon.

Var. **libellula** Risso.—Frequent. Bristol (Bristol Mus.); Weston-super-Mare; Burnham; Milton Clevedon, and Bruton (Heginbotham); Woods and gorse at Bratton St. Maur.

Var. **major** Fér.—I have a very fine specimen from the Burnham sand hills, which may be referred to this variety; Blagdon; Weston-super-Mare (Bristol Mus.).

Var. **minor** Moq.—Bristol (Bristol Mus.); sand dunes at Burnham.

Var. **olivacea** Risso.—Taunton (Bowell); Milton Clevedon, Bruton. Common at Burnham. I have a form intermediate between *olivacea* and *castanea*, taken from gorse bushes on Grovelands, Bratton St. Maur.

Var. **petiveria** Moq.—Weston-super-Mare; Milton Clevedon, Higher slopes of hill; from gorse, Bratton St. Maur.

Var. **conica** Pascal.—A fine example from Abbott's Hill, Bratton St. Maur.

1 *Science Gossip*, 1892.

Var. **compressa** Terver.—Hedgebank at foot of Bratton Hill. One example.

Var. **lurida** Moq.—Some very beautiful forms from the hedge-banks at the top of Milton Clevedon Hill; also from Grovelands, Bratton St. Maur.

Var. **undulata** Gent.—Same localities as the preceding variety.

Var. **coalita** Moq.—Common at Burnham. Frequent amidst gorse at Bratton St Maur. and Milton Clevedon.

Var. **hyalozonata** Taylor.—Burnham, rare.

Var. **citrino-zonata** Ckll.—Abbott's Hill, Bratton St. Maur.

Helix hortensis Müller.—Common everywhere. Especially abundant in hedge-banks near dwelling-places. Subject to great variation.

Var. **lutea** Moq.—A common form, occurring everywhere throughout the county.

Var. **luteo-lurida** Wlms.—A very local race. We have seen it abundantly in the hedge-banks at Holbrooke, near Wincanton; also on the hill tops at Milton Clevedon and Penselwood.

Var. **albina** Moq.—Not common. Bratton St. Maur, near Bruton. Bristol (Bristol Mus.).

Var. **major** Marq.—A *very* large specimen from Bratton St. Maur might be referred to this form.

Var. **minor** Moq.—Perfect specimens somewhat uncommon, for this variety must not be confounded with forms whose growth has been stunted by accidental injury to the shell. Bratton St. Maur, with many colour and form variations; Bath (Mrs. Oldroyd); Cuckoo Hill, Bruton (Heginbotham); Bristol Mus. Coll., several forms.

Var. **incarnata** Moq.—Frequent in and around Wincanton and district. Penselwood (E.W.S.).

Var. **lilacina** Taylor.—A local and beautiful variety. Hedge-banks at Holbrooke, Bratton St. Maur; Bath (Mrs. Oldroyd); Hatch Beauchamp (Bowell); also in Bristol Mus. Coll.

Var. **pallida** Cockerell.—A pale purplish form, very local. Hedge-banks at Bratton St. Maur and Cuckoo Hill, near Bruton.

Var. **olivacea** Taylor.—Very local. Near Bruton.

Var. **baudonia** Moq.—An extremely rare form; I have only observed it in hedge-banks in the village of Bratton St. Maur.

Var. **tenuis** Baud.—Bratton St. Maur.

Var. **roseozonata**.—This extremely pretty form occurs amidst the gorse bushes on Abbott's Hill, Bratton St. Maur.

Var. **roseo-labiata** Taylor.—A well-distributed variety.

The Conchological Society.

THE ANNUAL MEETING

WILL BE HELD AT THE

London and North Western Hotel, Stafford,

On SATURDAY, 21st OCTOBER, 1899,

And will take the place of the ordinary October Meeting.

PROGRAMME.

4 p.m.—Council Meeting.

4 p.m.—Exhibition of specimens.

5 p.m.—Meat Tea provided (price 2/- each) for any one who sends in his name to the Manager, London and North Western Hotel, Stafford, not later than October 19th.

6 p.m.—General Meeting.

Business :

Annual Reports and Balance Sheet.

Election of Officers and Council for 1899-1900.

President's Address by LIONEL E. ADAMS, B.A.

"Some of our Minute Land Shells."

EXHIBITS.

Members who intend to exhibit, are requested to furnish particulars of their exhibits and amount of table space required, to Mr. L. E. ADAMS, 68, Wolverhampton Road, Stafford, not later than October 16th.

W. E. Hoyle.

Hon. Sec.

This paper to be returned in time for the Annual Meeting, October 21st, 1899, in sealed envelope, SIGNED OUTSIDE by the Member voting, and addressed to "The Scrutineers, Conchological Society, c/o W. E. HOYLE, The Museum, Owens College, Manchester," or delivered to him on the day of meeting at the London and North Western Hotel, Stafford.

Conchological Society.

VOTING PAPER.

The under-named are Nominated for the respective offices for 1899-1900.

President:

E. R. SYKES, B.A. ..... | .. ..

Vice-Presidents:

LIONEL E. ADAMS, B.A. ..... | ....

R. D. DARBISHIRE, B.A., F.G.S. ..... | ....

PROF. SYDNEY J. HICKSON, D.Sc., M.A., F.R.S. | ....

J. R. B. MASEFIELD, M.A. ..... | ....

Hon. Treasurer:

E. D. BOSTOCK ..... | .....

Hon. Secretary and Librarian:

W. E. HOYLE, M.A., F.R.S.E. ..... | .....

Hon. Curator:

ROBERT STANDEN .... | ....

Hon. Recorder:

THOMAS ROGERS..... ..... | ....

Council:

G. W. CHASTER, M R.C.S. ..... | ....

J. T. MARSHALL ..... | ....

J. COSMO MELVILL, M.A., F.L.S. ..... | ....

WILLIAM MOSS, F.C.A. .... | ....

E. C. STUMP .... | ....

R. J. WELCH .... | ....

Members voting are at liberty to substitute for any name disapproved of the name of any other Member of the Society, or they may at their option erase names without necessarily substituting others. Members wishing to vote for the list as nominated, should send in the paper unmarked.

☞ The Voting Paper must not be signed.

Var. **fusco-labiata** V. Marts.—Well distributed.

Var. **lurida** Moq.—With the bands half-effaced. Frequent at Bratton St. Maur.

Var. **arenicola** Macgill.—Very common. I have paid great attention to the banding of this species within a comparatively small area, viz., Bratton St. Maur and surrounding villages, bounded by the towns of Wincanton, Bruton, and Castle Cary, and have secured the following variations (Von Martens' band formula):—

00000	[1](12345)	003(45)
00005	00300	(123)(45)
00045	10005	1(23)(45)
10345	10045	1(234)5
12345	02345	123(45)
100(45)	000(45)	

It has been recorded that the absence of the third or peripheral band, or its presence only (as seen so commonly in *H. nemoralis*) is of rare occurrence in *H. hortensis*; yet of the twenty-four possible band variations in which the peripheral band is absent (including the totally bandless form, so called variety *unicolor*), we have secured eight in our district. Cockerell[2] has given a list of all the then known band variations of *H. nemoralis* and *H. hortensis*, to those of the latter I may add 02345, 000(45), 100(45), 003(45), (already given above and not recorded in his list). B.F. 00300 is decidedly rare, I have only 2 or 3 examples.

Helix arbustorum L. — "Frequent, though local. I have taken it in the lane leading from Clevedon to Clapton; under heaps of stones on Strawberry Hill, Clevedon; upon the banks of the canal at Bath; among nettles at Cheddar Cliffs; and hedge-banks near Axbridge" (Norman). To the above localities we may add Dundry and Leigh Woods, Bristol (examples in the Wilson Collection, Bristol Mus.); near Taunton (Bowell); hedge-banks on the lower slopes of Castle Cary Hill (Macmillan); West Pennard, Glastonbury; also at Pitcombe, Milton Clevedon, and many other places in and around Bruton.

Var. **major**.—Leigh Woods, Bristol (Bristol Mus.).

Var. **fuscescens** D & M.—Bath; Milton Hill, near Bruton; hedge-banks at Castle Cary.

Var. **albina** Moq.—Bath (Bristol Mus.).

Var. **conoidea** West.—Leigh Woods, Bristol (Bristol Mus.); hedge-banks at Milton Clevedon; and the lower slopes of Creech Hill, towards Bruton.

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1 Var. *coalita* of Moq.-Tand.

2 *British Naturalist*, July, 1894.

Var. **flavescens** Moq.—Bath; Bristol (Bristol Mus.); Gants Mill, near Bruton, Castle Cary, a conoidal form.

Var. **cincta** Taylor.—Near Bruton, rare (Heginbotham).

Helix cantiana Mont.—An extremely local species. "Brislington is the only locality in Somersetshire in which we know this shell to occur. It was first taken there by Mr. Miller" (Norman). All attempts to introduce it (and I have made several) at Bratton St. Maur, have failed. There are specimens in the Jenyns collection (Bath Mus.), probably from the Bristol district. Ashleigh Hill, and Leigh Woods, Bristol (Cundall, and verified by Mr. Wilson); Avon Gorge (Bristol Mus.). "Common in one extended locality at Hatch Beauchamp, near Taunton" (Bowell).

Var. **albida** Taylor.—Bristol (Bristol Mus.).

Var. **minor** Moq.—Dundry, near Bristol (Bristol Mus.).

Helix rufescens Pennant.—"Varies according to the habitat. Those among brambles and in hedges are mostly large and horn-coloured while specimens from drier situations are smaller, deeper in colour, and more elevated in the spire" (Norman). Commonly distributed.

Var. **depressa** Loc.—Toomer, near Henstridge.

Var. **minor** Jeffr.—Abbott's Leigh (Bristol Mus.).

Var. **rubens** Moq.—Bath. Common throughout the Wincanton district.

Var. **albo-cincta** Ckll.—With a white peripheral band. From rejectamenta of the stream at Shepton Montague, Feb. 1897.

Var. **alba** Moq.—A frequent form. I have often observed it on the leaves of *Arum maculatum*. Bath, Wincanton, Glastonbury, Bruton, etc., etc. "Near Clevedon, stones lying by an old lime kiln" (Norman).

A pronounced variation, which is probably new, very convex, with spire generally elevated and deep sutures, was obtained from rejectamenta of stream at Shepton Montague, and from hedge-banks, Bratton St. Maur.

Helix hispida L. (=*H. concinna* Jeffr., which for a long time was considered a distinct species).—Jeffreys' *H. hispida* being identical with Mousson's var. *hispidosa*, it now ranks as that variety. Albino varieties of both forms having been recorded, I have discarded *albida-hispida* and retained Jeffreys' albino form of *concinna*. A very common species.

Var. **albida** Jeffr.—Ashley Downs (Cundall); Bath; Castle Cary; churchyard at Bratton St. Maur.

Var. **nana** Jeffr.—There is a variety *minor* recorded for Bath by Mr. Clark, which might be referred to v. *nana*, which is much smaller, with a strong labial rib.

Var. **depilata** Alder.—"Rare on Cadbury Hill; Yatton and Ebbor Rocks, near Wells" (Norman). Rejectamenta of the stream at Shepton Montague.

Var. **subglobosa**, Jeffr.—Churchyard, Bratton St. Maur. Rare. Two specimens from débris of stream below Shepton Montague.

Var. **hispidosa** Mouss.—A very common form throughout the county.

Var. **subrufa** Moq.—Rejectamenta of stream at Shepton Montague, and of the River Brue below Castle Cary. Frequent in hedgerows Bratton St. Maur.

Var. **albo-cincta** Taylor.—With a whitish peripheral band. One example from stream débris at Shepton Montague.

***Helix fusca** Montagu.—A very local species, frequenting hedge banks. Leigh Woods, Bristol (Cundall); Gribb Wood, Bratton St. Maur, not common; hedgebanks by road-side on the upper slopes of Milton Hill, near Bruton; Hatch Beauchamp, near Taunton. "Local but occurring in several hedge-banks. It seems to be fond of moss as a habitat" (Bowell).

***Helix granulata** Alder.—A rare species, apparently to be found only in the neighbourhood of Bristol. There are unlabelled specimens in the Jenyns collection (Bath Mus.). Only records are Ashley Marsh, Bristol (Bristol Mus.); rejectamenta of the Avon (Norman).

Helix itala L.—A somewhat local species, but abundant where it occurs. Examples, unlabelled, in the Jenyns collection (Bath Mus.); and others from Burnham, in the Wilson collection (Bristol Mus.). "Cadbury Camp, Mendips, near Wells; and Wrington. Abundant but somewhat local" (Norman). Stapleton; Ashley Hill (Cundall); Castle Cary; road over hill leading to Ansford; Crawlands and Holbrooke; Bratton St. Maur; very abundant on Creech Hill, near Bruton.

Var. **instabilis** Ziegl.—Near Clevedon (Bristol Mus.).

Var. **minor** Moq.—Crawlands, Bratton St. Maur, frequent. St. Vincent's Rocks, Bristol (Cundall); Burnham (Bristol Mus.); on Creech Hill, Bristol, very common.

Var. **leucozona** Moq.—Cornfields at Holbrooke, Bratton St. Maur; also on Creech Hill, Bruton.

Var. **lutescens** Moq.—On Creech Hill. Common.

Helix caperata Montagu.—Common everywhere in dry situations preferring a calcareous soil.

Var. **subscalaris** Jeffr.—Two examples from the railway cutting (S. & D. J. R.) at Shepton Montague.

Var. **ornata** Pic.—A common form.

Var. **fulva** Moq.—An equally common form.

Var. **nana** Ckll. (?)—A dingy-grey and very small form from Creech Hill, near Bruton.

Var. **obliterata** Pic.—Common in the neighbourhood of Wincanton, Castle Cary, and Bruton.

Var. **lutescens** Ckll. (?)—A dirty reddish-yellow, unicolorous form from a quarry on the summit of Castle Cary Hill. This form has entirely adopted the colouring of the stones of the quarry, and is altogether remarkable and interesting.

Helix virgata Da Costa.—A somewhat local species, judging from the records to hand. It is very common around Wincanton and Bruton. Liable to great variations. We here give *in toto* Norman's remarks upon it: "Near Burnham one variety is found wholly deep chocolate brown, and another brown with a narrow white band running round the base of the whorls, and more or less lineated round the umbilicus. A third resembles the last, but has in addition to the basal white fillet, a row of white spots round the upper margin of the whorls. A fourth is white, with one, two, or three interrupted spiral bands. Intermediate specimens as well as the more common varieties are also to be found. On the sand-hills at Barrow, these varieties are replaced by a fifth which is milk-white, with the exception of the mouth and apex which are rufous. In Tickenham Churchyard the milk-white variety with translucent bands is to be found. We have taken a reversed specimen on the sea wall near Clevedon." Specimens (loc. ?) in the Jenyns collection (Bath Mus.); Abbott's Leigh, collected by Wilson (Bristol Mus.); Clevedon, and Portishead.

Var. **sub-aperta** Jeffr.—Bath (Clark).

Var. **carinata** Jeffr.—Bratton St. Maur. Rare.

Var. **lineata** Olivi.—Clevedon (MacMurtrie).

Var. **minor** Taylor.—Creech Hill, near Bruton. Rare.

Var. **leucozona** Taylor.—Bristol (Wilson coll., Bristol Mus.); Burnham (Norman); quarry on top of Castle Cary Hill.

Var. **maculata** Moq.—Holbrooke, Bratton St. Maur, near Burnham (Norman).

Var. **albicans** Grat.—Bath (Mrs. Oldroyd); Penselwood; Minehead; near Bristol (Wilson coll., Bristol Mus.); Berrow (Norman); Holbrooke, Bratton St. Maur, common; hills around Bruton and Batcombe.

Var. **alba** Taylor.—Tickenham Churchyard (Norman).

Var. **rufula** Moq.—Near Burnham (Norman).

Var. **subdeleta** Ckll.—Creech Hill, near Bruton; and a small form from Crawlands, Bratton St. Maur.

Monstr. **sinistrorsum** Taylor.—Sea wall near Clevedon (Norman)

Helix acuta Müller.—Confined exclusively to the sand-hills of the coast, especially abundant in the neighbourhood of Burnham. I might draw attention to an extremely doubtful locality for it, given in Cundall's list, where it is recorded for "Leigh Woods and the Downs, Bristol." Norman records it for Burnham and Weston; the examples in the Bristol Museum are from the former locality, where I have very frequently taken var. *strigata* Menke.

Buliminus montanus Drap.—Apparently confined to the Mendips, and Bristol and Bath districts. "Though nowhere to be met with in any numbers *Bulimus lackhamensis* is widely distributed throughout Somersetshire" (Norman); Neighbourhood of Bristol (Miller, Jeffr.); Beachen Cliff and woods on Claverton Down, Bath (Clark, Mrs. Oldroyd); and there are examples in the Jenyns collection (Bath Mus.); near Cheddar (Rev. W. H. Hawker); "Hedgebank on road between Axbridge and Cheddar, three-quarters-of-a-mile from the former" (Norman); Milton, Clevedon Hill, two miles from Bruton; common. Frequenting the decaying fronds of *Scolopendrium vulgare* in summer; in the late autumn I have found it concealed in the hollow dried stalks of various umbelliferous plants (E.W.S.).

Buliminus obscurus Müller.—A common species. Examples in Jenyns coll. (Bath Mus.), and Wilson coll. (Bristol Mus.).

Var. **albina** Moq.—Coombe Down, Bath (Mrs. Oldroyd). Abbott's Leigh (Bristol Mus.).

Pupa secale Drap.—A local species, and, like *B. montanus*, confined to the northern half of the county. Coombe Down, Bath (Mrs. Oldroyd); Examples in the Jenyns coll. (Bath Mus.); Leigh Woods, Bristol (Cundall); "Abundant amongst limestone rocks, Wrington, Yatton, Clevedon, Wells, and Cheddar" (Norman).

Pupa cylindracea DaCosta.—A common species. Jenyns coll. (Bath Mus.); Wilson coll. (Bristol Mus.).

Var. **edentula** Moq.—Bratton St. Maur; rare (E.W.S.); Near Tickenham (Norman).

Var. **albina** Moq.—Near Clevedon (Bristol Mus.). Ebbor Rocks near Wells, and Clevedon (Norman).

Var. **curta** Westl.—Rejectamenta of the river Cale at Burton's Mill above Wincanton (E.W.S.).

Var. **gracilis** Issel (?)—"A fine produced variety occurs among the ruins of Walton Castle" (Norman).

Pupa muscorum L.—A local species. Leigh Woods, Bristol (Bristol Mus.); Jenyns coll. (Bath Mus.); Coombe Down, Bath (Mrs. Oldroyd); Rejectamenta of the Brue at Castle Cary, and of the stream at Shepton Montague (E.W.S.).

Var. **bigranata** Rossm.—Weston-super-Mare and Bath (Clark).

Var. **albina** Menke.—Clark, see Rimmer (**80**, p. 156). Locality?

Var. **edentula** Moq.—With type (Norman).

Vertigo pygmæa Drap.—A common species. Jenyns coll. (Bath Mus.); Extremely abundant in rejectamenta of the streams in the Wincanton district (E.W.S.).

Var. **quadridentata** Stud.—Clevedon (Norman).

***Vertigo antivertigo** Drap. — An extremely local and rare species; "at Bath and Bristol under ash boughs that have lain long on the ground" (Jeffr.); Rejectamenta of the Avon (Norman); Rejectamenta of the stream at Shepton Montague, below the railway cutting, abundant (E.W.S.).

***Vertigo substriata** Jeffr.—Very rare. The only record is Leigh Down, near Bristol (Miller).

***Vertigo alpestris** Alder.—Very rare. Only record, the canal banks, at Sharpness (Jones).

***Vertigo pusilla** Müll.—Apparently very rare. Only record is from near Bristol, in rejectamenta of the river Avon (Jeffr.).

***Vertigo angustior** Jeffr.—Another very rare species, found in company with the preceding species (Jeffr.).

***Vertigo edentula** Drap.—A very local species. Examples in Jenyns coll., locality? (Bath Mus.); it occurs in Ellescombe and Holbrooke Woods near Wincanton; and I have taken it from the rejectamenta of the river Cale, at Burton's Mill, above Wincanton, and the stream at Bratton St. Maur.

Var. **columella** von Marts.—Two examples from rejectamenta of the Bratton stream (E.W.S.).

Balea perversa L.—Well distributed in the northern part of the county. Bristol (Wilson coll.); Bath (Jenyns coll.); common on many old walls in the Wincanton district, rejectamenta of the Brue at Castle Cary (E.W.S.); "common in several orchards under the loose pieces of bark from the apple trees at Hatch Beauchamp, near Taunton" (Bowell); "very local, under moss on trees in Small Coombe Wood, Bath; among decaying leaves on Walton Downs, near Clevedon; also at Brockley Coombe, and near Wells" (Norman).

Clausilia perversa Pult.—Generally distributed.

Var. **everetti** Miller.—Bristol (Miller); Leigh Woods (Bristol Mus.); rejectamenta of Avon, and Mendip Hills, near Axbridge, not uncommon" (Norman).

Var. **tumidula** Jeffr. — Brockley Coombe, Bristol (Jeffr.); Milton Clevedon and Bratton St. Maur (E.W.S.).

Var. **gracilior** Jeffr.—Leigh Woods (Bristol Mus.); Bratton St. Maur (E.W.S).

***Clausilia rolphii** Gray.—A very rare species, occurring only at Long Ashton, near Bristol; Wilson coll. (Bristol Mus.).

***Clausilia biplicata** Mont.—Another very rare species, apparently confined to the Bristol district. "Stated by Miller to exist in the neighbourhood of Bristol" (Forbes and Hanley); Leigh Woods (Cundall).

Clausilia laminata Mont.—A well-distributed species.

Var. **pellucida** Jeffr.—Stoke Bishop and Leigh Woods (Cundall); "Avon Gorge, near Suspension Bridge, Somerset side" (Bristol Mus.).

Var. **albina** Moq.—A frequent form. Brockley Coombe (Cundall); Leigh Woods (Wilson coll.); Box Wood, Bath (Clark); Coombe Down, Bath (Mrs. Oldroyd); Hatch Beauchamp, Taunton, three specimens (Bowell); Woolston, near Wincanton (E.W.S.); "around an old lime-kiln, Clevedon" (Norman).

Azeca tridens Pult.—"Brockley Coombe is the only Somersetshire locality known for this shell. It should be looked for more especially on the south side among damp moss" (Norman). Brockley Coombe, Bristol (Cundall).

Var. **crystallina** Dup.—Brockley Coombe (Jeffr.).

Cochlicopa lubrica Müll.—Common everywhere.

Var. **lubricoides** Fér.—Bath (Clark).

Var. **hyalina** Jeffr.—Creech Hill, Bruton (E.W.S.).

Cæcilioides acicula Müll.—A local species. There are examples in the Jenyns collection, Bath; those in the Bristol collection are labelled "from an ant hill, Clifton." Yatton, Leigh Woods (Cundall). Leigh Down (Miller). "Roots of grass, Clevedon Hill; Mendips, near Wells; and among rejectamenta of the river Avon" (Norman), Taunton (Rev. W. R. Crotch). Hatch Park, Taunton; one specimen only (Bowell). Rejectamenta of the Cale, above Wincanton (E.W.S.). Rejectamenta of the Brue, below Castle Cary, in large numbers (E.W.S.). Rejectamenta of a rivulet at Bratton St. Maur (E.W.S.).

Succinea putris L.—Abundant in the rhines on the moors. Kenn Moor (Norman). Yatton (Bristol Mus.). Examples in Jenyns coll. (Bath Mus.). Very common in ditches on the moors around Glastonbury (E.W.S.).

Var. **albida** Mörch.—Pennard Moor near Glastonbury (E.W.S.).

Succinea elegans Risso.—A well-distributed species. Barrow Gurney (Bristol Mus.). Bath, Burnham, Glastonbury, Wincanton (E.W.S.).

Var. **albida** Taylor.—Near Bristol (Bristol Mus.). In a quarry pool, Bratton St. Maur; rare (E.W.S.).

Var. **pfeifferi** Rossm.—Near Clevedon (Norman).

Succinea oblonga Drap.—A doubtful record from Burnham (Cundall).

Carychium minimum Müll.—Fairly common and well distributed. "Common, especially among decaying beech leaves, Yatton, Wrington, Brockley Coombe, Clevedon, Wells" (Norman). In large numbers from rejectamenta of the river Brue, below Castle Cary (E.W.S.).

Planorbis fontanus Lightfoot.—A local species. "In a pond at Yatton, and another at Weston-in-Gordano" (Norman). Ponds at Hatch Park, Taunton (Bowell). Grosvenor, Bath (Mrs. Oldroyd). Rejectamenta of river Brue, below Castle Cary; and in ponds at Holbrooke, near Wincanton (E.W.S.).

Planorbis nautileus L.—Common. Examples from Failand (Wilson coll., Bristol Mus.).

Var. **crista** L.—Of common occurrence with the type in the Wincanton district (E.W.S.).

Planorbis albus L.—Local, but having a wide range. "Scarce. Found in a few rhines on Kenn Moor, and in a pond near Wells, also at Weston-super-Mare" (Norman). Grosvenor, Bath (Mrs. Oldroyd). Jenyns coll. (Bath Mus). Beer Crowcombe, near Taunton, uncommon (Bowell). River Stour, Gaspar (E.W.S.); rejectamenta of river Brue, at Castle Cary, and of streams at Bratton St. Maur and Shepton Montague (E.W.S.).

Var. **draparnaldi** Shepp.—Bristol (Jeffr.).

Planorbis parvus Say.—Very rare. Bristol and Clevedon only. "My *Planorbis glaber* (*P. lævis* of Alder) was first found at Bristol. It is the *Planorbis rossmässleri* of continental writers" (Jeffr.). "We have taken it fine and in great abundance in a large pond by the railway side, at the third (?) bridge from Clevedon" (Norman).

Planorbis spirorbis Müller.—Common in ponds and ditches in the northern part of the county. No records from the south.

Var. **albida** Nelson.—From a pond near Penselwood; rare (E.W.S.).

Planorbis vortex L.—"Very common on the whole of the western side of the county in rhines and ponds" (Norman). Jenyns coll. (Bath Mus.). Yatton (Bristol Mus.). "Horwood, near Wincanton; very abundant in rhines on Pennard Moor, near Glastonbury (E.W.S.).

(To be continued).

A CONTRIBUTION TOWARDS A LIST OF THE MARINE MOLLUSCA OF TENBY AND NEIGHBOURHOOD.

By BARTLET SPAN.

(Read before the Society, March 8th, 1899).

As I have seen nothing like a complete list of the marine shells that have been found in the above-named localities, I propose to give a list of those species that I have obtained by shore collecting, dredging, and from trawlers during the past ten yeas.

As my dredging expeditions have been few I have no doubt that any one who would dredge thoroughly off this coast would be able to add a good many species to those obtained by me.

The paucity of harbours on this coast, and the dangers of a lee shore from the south-west gales, that spring up so suddenly, and the strong currents that prevail, especially during spring tides, render dredging unpleasant in an ordinary boat. At times the Laugharne and Pendine sands (which extend from the village of Pendine to the Laugharne river, a distance of seven miles) are strewn with shells. *Ceratisolen*, all the Solenidæ (except *S. pellucidus*), *Mactra stultorum* and its variety *cinerea*, *Tellina tenuis*, *T. balthica*, *T. fabula*, *Donax vittatus*, *Scrobicularia piperata*, *S. alba*, *Thracia papyracea*, *Venus gallina*, *Philine aperta* and *Actæon tornatilis* in thousands, heaps of valves of *Lutraria elliptica*, a number of *Cardium echinatum*, *C. edule*, *Utriculus obtusus*, and *Hydrobia ulvæ*, with an occasional shell of some fifty other species. Some of the specimens found on these sands are of unusually large dimensions as will be seen from measurements that I have given elsewhere.

The list of species is as follows :—

Anomia ephippium L.—On rocks and stones at low water, spring tides, near Giltar Head.

Var. **squamula** L.—With the type.

Var. **aculeata** Müll.—On stones and roots of *Laminaria*. Tenby and Caldy Island.

Var. **cylindrica** Gm.—On stems of seaweed, Pembrokeshire coast.

Ostrea edulis L.—The Tenby oysters taken from the beds, off Caldy, and between Caldy and St. Govan, are well-known.

Pecten pusio L.—My best specimens are from the oyster beds. Valves only from Caldy, Tenby, and Freshwater West.

P. varius L.—At times plentiful (alive and dead) on Tenby sands. Attached to stones and oyster shells, at Milford Haven. Some of the shells are large, and mostly clean and bright coloured.

P. opercularis L.—Nowhere common, except at times, on Tenby sands, when numbers are found living. The shells are very bright and varied in colour and marking, but nearly always small.

Var. **lineata** Da C.—With the type.

P. tigrinus Müll.—Rare. Two perfect specimens, Tenby. Valves from Freshwater West Bay.

P. maximus L.—Valves only. Tenby, Laugharne and Milford Haven.

Pinna rudis L.—Trawled in Caermarthen Bay.

Mytilus edulis L.—Numerous all along the rocky coast.

Var. **incurva** Penn.—Good specimens from Freshwater West Bay.

Var. **pellucida** Penn.—Common, at times, on the Pendine and Laughharne sands. This variety is transparent and beautifully rayed.

Var. **galloprovincialis** Lam.—Three specimens only. Saundersfoot.

M. modiolus L.—Common on Tenby sands. Elsewhere scarce.

Var. **umbilicata.**—Two good specimens from Tenby sands.

M. barbatus L.—From various localities. My best specimens are from Tenby sands. Living and dead.

M. adriaticus Lam.—Common on Tenby sands.

Modiolaria marmorata Forbes.—Caldy and Manorbier, scarce.

Nucula nucleus L.—Very abundant and some fine specimens at Milford Haven. A few at Tenby and Laugharne.

Var. **radiata** F. & H.—A few with the type.

N. nitida G. B. Sow.—Common, at times, near Saundersfoot.

Leda minuta Müll.—A few dredged at Milford Haven.

Var. **brevirostris** Jeffr.—Much more common in the same locality.

Pectunculus glycimeris L.—Dredged alive, Milford Haven. A few valves only elsewhere.

Arca lactea L.—Valves only. Caldy, and Freshwater West.

A. tetragona Poli—A few valves. Freshwater West.

***Montacuta bidentata** Mont.—Caldy Sound.

***M. ferruginosa** Mont.—Caldy.

Lasæa rubra Mont.—In crevices of rocks. Giltar, and Caldy.

Var. **pallida** Jeffr.—With the type.

Kellia suborbicularis Mont.—Common from stones dredged on the Tenby oyster beds.

Var. **lactea** Brown.—A few with the type.

Lucina borealis L.—Valves numerous, but perfect shells rare. Tenby sands.

***L. spinifera** Mont.—Milford Haven.

Diplodonta rotundata Mont.—Not uncommon. Tenby sands.

Cardium echinatum L.—Common (living and dead) on the sands between Saundersfoot and the Laugharne river.

C. exiguum Gm.—Common at Milford Haven.

***C. fasciatum** Mont.—Milford and Caldy.

C. edule L.—Fine examples from the Laugharne cockle beds. Some $1\frac{7}{8}$ in. by $1\frac{5}{8}$ in.

C. norvegicum Spengl.—Not uncommon. Tenby sands.

Cyprina islandica L.—Numerous. Milford Haven and between Tenby and Laugharne.

Var. **crassior** Jeffr.—More numerous than the type, in the same localities, especially at Milford Haven.

Astarte sulcata Da C.—Common at Milford Haven, rare at Tenby.

Var. **paucicostata** Jeffr.—Rare. Milford Haven.

Var. **incrassata** Broc.—Rare. Milford Haven.

Circe minima Mont.—Fairly common. Milford Haven.

Venus exoleta L.—Not common. Tenby and Milford Haven.

V. lincta Pult.—Not common. Milford Haven.

V. fasciata Da C.—Common, Milford Haven. Rare, Tenby.

V. verrucosa L.—Valves only. Milford Haven.

V. ovata Penn.—Numerous, Milford Haven. Scarce, Tenby.

V. gallina L.—Very plentiful in all sandy bays between Tenby and Laugharne River. I have specimens $1\frac{5}{8}$ in. in breadth from the Laugharne and Pendine sands.

Var. **alba.**—Common with the type.

Var. **laminosa** Mont.—With the type, rare.

Var. **gibba** Jeffr.—With the type, rare.

Var. **triangularis** Jeffr.—A few with the type. Lydstep Haven.

Tapes virgineus L.—Fairly common. Tenby sands.

T. pullastra Mont.—Very common on Tenby sands; some beautifully marked, and coloured purple, yellow, and pink.

Var. **perforans** Mont.—Common. Tenby, and near Saundersfoot.

T. decussatus L.—Valves only. Saundersfoot.

Lucinopsis undata Penn.—Common in all sandy bays between Tenby and the Laugharne river. Some very large.

***Gastrana fragilis** L.—Milford Haven.

Tellina balthica L.—Very plentiful between Pendine and Laugharne. Some specimens $1\frac{1}{4}$ in. in breadth.

T. tenuis Da C.—Numerous in all sandy bays between Tenby and the Laugharne river.

T. fabula Gron.—Plentiful on the Laugharne and Pendine sands.

T. squalida Pult.—Scarce, on all the sandy bays between Tenby and the Laugharne river.

Psammobia tellinella Lam.—Tenby, Freshwater West, and Pendine. Not common.

P. ferroënsis Chem.—This is usually an uncommon shell on this coast, but during the severe weather and high spring tides of February, 1895, they were washed ashore on Tenby sands (all the animals frozen) in hundreds. From these I obtained a nice series. Pure ivory white, chalk white, flecked with black, yellow, and purple and black (all these were rayless) besides fine specimens of the ordinary marking.

Donax vittatus Da C.—Numerous in all sandy bays between Tenby and Laugharne, and on Newgall sands, St. Bride's Bay.

Mactra solida L.—Common in all sandy bays.

Var. **truncata** Mont.—A few with the type.

Var. **elliptica** Brown.—Common on Tenby sands.

M. subtruncata Da C.—Saundersfoot, Tenby, Lydstep, and other sandy bays. Not common.

M. stultorum L.—Very numerous in all sandy bays along the coast. During the hard weather of February, 1895, they were in heaps, a foot or more deep, for miles, between Saundersfoot and the Laugharne river.

Var. **cinerea** Mont.—Numerous, with the type.

Lutraria elliptica Lam.—Numerous between Tenby and Laugharne, living and dead. Odd valves in millions.

Scrobicularia alba Wood.—Numerous and fine, near Saundersfoot, and on the Pendine and Laugharne sands.

S. piperata Bell.—Most abundant. Laugharne and Amroth. I have specimens $2\frac{1}{4}$ in. by $1\frac{3}{4}$ in. from the mud-banks in the latter locality.

Ceratisolen legumen L.—In millions on the Pendine and Laugharne sands. Common in all the sandy bays between Tenby and Pendine.

Solen ensis L.—Numerous between Tenby and Laugharne.

S. siliqua L.—Abundant in all the sandy bays between Monkstone and the Laugharne river. This species is eaten by the poorer classes. I watched men catching them. They were most successful and filled several buckets. The men walked backwards and the fish, disturbed by their footsteps, spurted out jets of water, which, when the men perceived, they thrust small darts into the air holes and seldom missed their prey. Several *L. elliptica* were speared, but had to be dug out as their shape gave them a firm hold of the sand. The Solens were drawn up without any difficulty.

Var. **arcuata** Jeffr.—Common, with the type.

S. vagina L.—Common on the Laugharne and Pendine beaches. Scarce on Tenby and other sands.

Pandora inæquævalvis var. **obtusa** Jeffr.—Dredged alive at Milford Haven. Fairly common.

Lyonsia norvegica Chem.—Not common. Some fine specimens (living and dead) from Tenby sands.

Thracia papyracea Poli.—Very abundant on the Laugharne and Pendine sands. Common on other sands.

T. distorta Mont.—Not common. Good living specimens from stones dredged on the oyster beds.

Var. **truncata** Turt.—One specimen, with the type.

Corbula gibba Olivi.—Fairly common at Saundersfoot, and Milford Haven. A few in other localities.

Var. **rosea** Brown.—A few with the type.

Mya arenaria L.—Common near the Laugharne river.

M. truncata L.—Common (living) on Tenby sands.

M. binghami Turt.—A nice series from stones dredged on the oyster beds.

Saxicava rugosa L.—Very numerous in the limestone rocks at Giltar, St. Catherine's and Caldy Islands.

Var. **pholadis** L.—Common, with the type.

Var. **arctica** L.—Attached to stones dredged on the oyster beds.

Venerupis irus L.—Two specimens from limestone, Giltar.

Gastrochæna dubia Penn.—Small dead specimens, Caldy.

Pholas dactylus L.—Dead specimens abundant, living rare, in mud banks near Amroth.

P. candida L.—Numerous, living, in old trunks of trees in the submerged forest between Saundersfoot and Amroth.

***P. parva** Penn.—Caldy Sound.

Teredo norvegica Spengl.—Good living specimens from wreckage brought into Tenby Harbour.

T. navalis L.—From wreckage thrown up on Tenby sands.

Dentalium tarentinum L.—Common, but seldom living. Tenby and Laugharne sands.

Chiton fascicularis L.—On stones. Tenby and other localities.

C. cinereus L.—On stones, same localities as preceding.

C. ruber L.—Two specimens on old valves of shells. Tenby.

Patella vulgata L.—Numerous, and varying in size, shape and colour, all along the rocky coast.

Var. **elevata** Jeffr.—Freshwater West, and Waterwynch.

Var. **depressa** Penn.—Waterwynch and other localities.

Helcion pellucidum L.—Numerous, on seaweed. Giltar, Caldy Island, Lydstep, &c.

Var. **lævis** Penn.—On roots of seaweed. Freshwater, Tenby and Caldy.

Tectura virginea Müll.—Uncommon. Caldy and Tenby.

Emarginula fissura L.—Dredged alive. Milford Haven.

Fissurella græca L.—Scarce. Tenby, Caldy and Freshwater.

Capulus hungaricus L.—Dredged at Milford Haven and off Tenby.

Calyptræa chinensis Lam.—Common, on valves of oyster and other shells. Milford Haven and Tenby sands.

Trochus magus L.—Common, Milford Haven. Rare, Tenby.

T. tumidus Mont.—A few dead specimens. Tenby sands.

T. lineatus Da C.—Common on rocky ledges. Freshwater West.

T. cinerarius L.—Common all along the coast.

T. umbilicatus Mont.—As common as the preceding.

T. exasperatus Penn.—One specimen. Tenby sands.

T. granulatus Born.—Fine specimens dredged in Caermarthen Bay.

Var. **lactea** Jeffr.—Two specimens, with the type.

T. zizyphinus L.—Common at Tenby, scarce elsewhere.

Var. **lyonsii** Leach.—Not uncommon. Tenby sands.

Phasianella pulla L.—Freshwater West and Caldy.

Lacuna crassior Mont.—Scarce. Tenby sands.

L. divaricata Fabr.—Common on seaweed. Giltar Point and Caldy Island.

L. pallidula Da C.—Common on seaweed. Giltar, Caldy Island and Lydstep.

Var. **albescens** Jeffr.—With the type.

Littorina obtusata L.—Common all along the coast.

L. rudis Maton.—Common all along the rocky coast, of various colours and sculpture.

Var. **jugosa** Mont.—A very prettily coloured example from Bullslaughter Bay, Pembrokeshire.

L. littorea L.—Common on the rocky coast.

Var. **brevicula** Jeffr.—Common near Tenby.

L. neritoides L.—Common. Tenby and Waterwynch.

Rissoa parva Da C.—Common. Caldy and Tenby.

Var. **interrupta** Adams.—Common. Caldy.

Var. **semicostata** Mont.—Common. Caldy.

R. costata Adams.—Common. Caldy.

R. membranacea Adams.—Common. Tenby and Caldy.

R. striata Adams.—Abundant. Tenby and Caldy.

Var. **distorta** Marshall.—A few with the type.

R. vitrea Mont.—Rare. In shell-sand. Tenby.

R. semistriata Mont.—Common in shell-sand. Caldy.

R. cingillus Mont.—Scarce, in shell-sand. Caldy.

***R. costulata** Alder.—Caldy Sound.

***R. inconspicua** Alder.—Caldy Sound.

Hydrobia ulvæ Penn.—Swarming on mud flats. Laugharne.

Turritella terebra L.—Numerous, living, at Milford Haven and Newgall sands, St. Bride's Bay.

Var. **nivea** Jeffr.—A few with the type. Milford Haven.

Var. **gracilis** Jeffr.—A few with the type. Milford Haven.

***Truncatella truncatula** Mont.—Caldy Sound.

Scalaria communis Lam.—Not uncommon on Laugharne sands. Only dead shells, but fresh and of a large size.

S. **turtonæ** Turt.—Common on Laugharne sands. Only dead shells, but fresh, some specimens 2 in. in length.

S. trevelyana Leach.—Rare. One or two from Laugharne sands, and dredged off Tenby.

S. clathratula Adams.—Not common. A few fine and large specimens from Laugharne (one 1 in. and two nearly $\frac{3}{4}$ in. in length). More common but smaller from Caldy Island.

Aclis unica Mont.—Rare. From shell-sand. Caldy.

A. ascaris Turt.—Rare. From shell-sand. Caldy.

A. supranitida S. Wood.—Rare. From shell-sand. Caldy.

Odostomia rissoides Hanl.—Common in shell-sand. Caldy.

O. unidentata Mont.—Common in shell-sand. Caldy.

O. turrita Hanl.—Rare in shell-sand. Caldy.

O. insculpta Mont.—Rare in shell-sand. Caldy.

O. indistincta Mont.—Common in shell-sand. Caldy.

O. interstincta Mont.—Common in shell-sand. Caldy.

O. scalaris Phil.—Rare in shell-sand. Caldy.

O. rufa Phil.—Uncommon. Tenby and Milford Haven.

O. lactea L.—Common in shell-sand. Caldy.

***O. pusilla** Phil.—Caldy Sound.

Eulima polita L.—Rare. Freshwater West.

E. distorta Desh.—Common. Caldy.

E. intermedia Cantr.—Rare. Freshwater West.

Natica sordida Phil.—Trawled off Milford Haven.

N. catena Da C.—Common in all sandy bays between Saundersfoot and the Laugharne river.

N. alderi Forbes.—Uncommon. Tenby and Laugharne.

Lamellaria perspicua L.—Small specimens from Caldy Island.

Velutina lævigata Penn.—Rare. Tenby sands.

Aporrhais pes-pelecani L.—Numerous in St. Bride's Bay. Rare on Tenby sands.

Cerithium reticulatum Da C.—Numerous. Caldy and Tenby.

C. perversum L.—Rare. Tenby sands.

Cerithiopsis tubercularis Mont.—Fairly common. Caldy Island.

Purpura lapillus L.—Very numerous all along the rocky coast. Varying much in shape and colouring. Some prettily banded.

Buccinum undatum L.—Common between Tenby and Laugharne.

Murex erinaceus L.—Common at Tenby, scarce elsewhere.

Var. **sculpta** Jeffr.—A few with the type. Tenby.

Trophon muricatus Mont.—Dredged off Tenby.

Fusus islandicus Chem.—One fine specimen near Tenby.

F. gracilis Da C.—Dredged off Tenby, alive and dead, on various localities on the coast.

Nassa reticulata L.—Common at Tenby, Laugharne sands, &c., seldom living.

N. incrassata Ström.—Common. Tenby and Freshwater West.

Defrancia gracilis Mont.—Not uncommon. Tenby and Laugharne sands, and dredged off Tenby.

D. linearis Mont.—Rare. Caldy Island.

Pleurotoma attenuata Mont.—Common. Tenby and Caldy Island.

P. costata Don.—Rare. Freshwater West.

P. nebula Mont.—Common. Tenby sands.

P. septangularis Mont.—Rare. Tenby sands.

P. rufa Mont.—Scarce. Tenby sands.

P. turricula Mont.—Common. Tenby sands.

Cypræa europæa Mont.—Common. Tenby sands.

Ovula patula Penn.—Rare. Dredged off Tenby and in Milford Haven.

Marginella lævis Don.—Rare. Freshwater West. One living specimen from a lobster pot, off Caldy.

Cylichna cylindracea Penn.—Common. Tenby.

Utriculus truncatulus Brug.—Scarce. Caldy.

U. obtusus Mont.—Common, near the Laugharne river.

U. hyalinus Turt.—Rare. Caldy Island.

Acera bullata Müll.—Numerous. Milford Haven.

Bulla hydatis L.—Rare. Tenby.

Scaphander lignarius L.—Common. St. Bride's and Caermarthen Bays.

Var. **alba** Jeffr.—With the type.

Philine aperta L.—Plentiful (living). Pendine and near Saundersfoot. Uncommon elsewhere.

P. catena Mont.—Rare. Caldy Island.
P. punctata Clark.—Rare. Caldy Island.
Aplysia punctata Cuvier.—Scarce. Tenby and Saundersfoot.
Melampus bidentatus Mont.—Giltar Head.
M. myosotis var. **ringens** Turt.—In a cave, above high water mark, near Giltar Head.

Var. **alba.**—With the above named.

[The species marked * were seen by me in the cabinet of a friend after my paper had been read. Most of them had been procured by the dredge.—April 7th, 1899].

HEYWOOD MOUNT, TENBY,
20th FEB., 1899.

Helix acuta monst. **sinistrorsum at Tenby.**—On August 29th, in company with Mr. A. G. Stubbs, I paid a visit to "The Burrows" at Tenby. The weather was wet, and the snails out in abundance, and on the edge of the golf-links, in a fringe of short grass at the foot of a small sandhill, I took a great number of *Helix acuta*, both the typical form and varr. *articulata*, *strigata*, and *bizona*. My chief prize, however, was a living sinistral specimen; it is rather small, measuring 10 mm. in height by 5 mm. in breadth, but is apparently mature. I have never heard of the occurrence of sinistral shells of this species before, and if this be the first record I can only say that it is very singular that amongst the millions observed on our coasts no others have been detected.—FRED TAYLOR (*Read before the Society*, Nov. 9th, 1898).

Note on Clausilia semidenticulata Pfr.—Of the specimens of this species herewith presented to the Society's cabinet, the smaller ones were found at Magnesia ad Mæandrum, the larger at Sochia in Asia Minor. For the identification of these I am indebted to Dr. Boettger, of Frankfort, who writes me regarding them: "They agree with the description and figures given by Küster, though they are larger; this, however, does not prevent me from regarding them as *Cl. semidenticulata*. They stand between *Cl. denticulata* Ol. and *Cl. thessalonica* var. *spreta* Gr." So far as I am aware, this is the first time this species has been taken on the mainland of Asia Minor, having hitherto only been found on some of the Ionian Islands and on the European side of the Bosphorus.—J. BLISS (*Read before the Society*, April 12, 1899).

Limax cinereo-niger in Carnarvonshire and Denbighshire.—This slug is fairly plentiful in the woods of the Conway Valley in the neighbourhood of Trefriw and Bettws-y-Coed. In the early part of May, 1898, I collected several specimens on the Carnarvonshire side of the river, from beneath the bark of dead trees where they were always associated with *Limax marginatus*. I had few opportunities of searching the woods on the Denbighshire side, but found an immature example beneath the bark of a dead ash at the Conway Falls. All the slugs were referable to the variety *luctuosa* Moq.—CHAS. OLDHAM (*Read before the Society*, Jan. 11th, 1899).

OBITUARY NOTICE OF THE LATE JOSEPH CHARLES HIPPOLYTE CROSSE.

Adapted from the French Memoir of C. Poyard and H. Fischer,

By CLARA NÖRDLINGER.

With a portrait presented to the Society by the family of the late M. Crosse.

(Read before the Society, May 10th, 1899).

Joseph Charles Hippolyte Crosse was born on October 1st, 1826, and was educated at the Collège Bourbon, where he studied diligently and distinguished himself chiefly in the class of humanity. He was gifted with rare facility for learning, and at an early age his range of knowledge was extensive.

At college he excelled in Latin verse, and his work was equally appreciated by his professors and fellow students. On leaving the Collège Bourbon, Crosse took his legal degree as became the son of a lawyer, and succeeded in this undertaking as in everything he attempted. But his own inclinations were already strongly urging him towards the natural sciences to which he was later to devote all his energy. When hardly fifteen years old, a nephew of Adanson had given him a number of shells which formed the nucleus of the magnificent conchological collections gathered by him during fifty years of patient study and research. In 1849 he visited the southern coast of France and for the first time travelled with a purely scientific aim. He brought back a number of specimens and henceforward devoted himself entirely to his favourite study. Ere long he had put himself into communication with the principal workers in the same field both at home and abroad.

In the year 1850 Petit de la Saussaye founded the *Journal de Conchyliolgie*, which, however, soon ceased to appear. Six years later Messrs. Fischer and Bernardi resuscitated the *Journal*, and in 1861 Crosse began to collaborate and to give the paper his welcome material assistance. For thirty-seven years Crosse and Fischer were associated in the editorship of the *Journal* which soon took a high place in the field of scientific literature.

Crosse's next great undertaking was the work on the Terrestrial and Fluviatile Mollusca of Mexico and Guatemala, which forms one of the seven parts of Milne Edwards' Zoological Researches on the history of the fauna of Central America and Mexico. Crosse and Fischer worked together, and in 1869, two years after Milne Edwards had been entrusted with the organization of this great scientific publication, Crosse was writing the introduction to the portion confided to him and his friend. Their work was continued uninterruptedly for twenty-five

years, and after Fischer's premature death, Crosse still laboured at his task which was not even ended when he died.

The scientific work of Hippolyte Crosse, which is no less remarkable for quality than for quantity, is the outcome of methodical and persevering study of that branch of science to which his life's work was devoted.

His first important publication in the 2nd vol. of the *Journal de Conchyliologie* contained the interesting results of his travels with Cotteau in the south of France, Italy, Corsica, and Sicily, where many rare shells came under his observation. His connection with travellers in distant lands soon helped to increase his private collection of shells, which it would be difficult to rival both in extent and in interest outside any of the well-known museums. His library was no less complete, and contained some of the rarest conchological works, which were readily placed at the disposal of anyone who cared to come and consult them.

Unusual intelligence, combined with great conscientiousness, marked every phase of Crosse's work, and these qualities were not restricted to his purely scientific researches, but were equally displayed in the literary and business sides of his labours. Thus he would read the manuscript, review proofs and plates for the *Journal*, and even attend to the accounts and the minutest administrative details in his desire for completeness and excellence. No one who ever confided a collection of specimens to Crosse's care had cause to regret his confidence, and conchologists of all nations vied in expressing their respect and esteem for his work.

Crosse published almost all his writings in the *Journal*, which he thus enriched by some 355 papers and original memoirs, as well as bibliographical analyses and odd notes, containing a mint of useful information. These various publications, written partly in collaboration with Paul Fischer and other authors, have made known nearly 600 new species. The numerous articles which Crosse wrote on *Pleurotomaria* have done much to demonstrate the importance of this genus, which had long been known in its fossil form, but which had been believed to be extinct, until in 1856 Paul Fischer and Bernardi obtained a living specimen from the Antilles. Crosse soon found a second example in the collection of a Dr. Commarmand, where it had long lain unrecognised. These discoveries aroused such general curiosity that the American Government undertook special deep sea explorations in order to study the abysmal fauna of the Antillean regions.

Some of Crosse's writings treat of Conchological Palaeontology, but it would be impossible to enumerate a complete list of these and all his other articles here. We may, however, mention a few papers published outside the *Journal*, as for example the Notes on the Terrestrial

Mollusca of New Caledonia, which appeared in the *Revue et Magasin de Zoologie* between the years 1855 and 1859. One important work on the Natural History of the Mollusca of Madagascar, which was commenced with the assistance of P. Fischer, remained unfinished. Nor did Crosse live to enjoy the satisfaction of seeing the publication of the last part of his important studies on the Land and Freshwater Mollusca of Mexico and Guatemala.

Crosse possessed a very characteristic and distinguished style of writing which combined literary elegance with scientific exactitude. He would rigorously exclude all generic or specific terms of doubtful Latinity, and never admitted that naturalists had a right to ignore the idiom of a language which was once, and still ought to be, the universal scientific medium. He insisted that each detailed description of a new species should be accompanied by an exact Latin diagnosis. How much easier of access would be the obscure works of foreign writers if this rule were universal.

Crosse was a faithful supporter of Cuvier's theories and held firmly the conception of a species as a permanent entity. The Darwinian theory of the variability of species, which was in opposition to his philosophical and religious tenets, was never accepted by him, or granted to be more than a hypothesis, seductive no doubt, but void of sufficient proof. In contradiction to the theory of evolution, he would cite as a positive and indisputable fact the persistence of such ancient genera as *Pleurotomaria* and *Lingula*, which are still represented with their unaltered primitive characteristics.

Crosse repeatedly opposed the tendency of certain naturalists who desire to abolish the Linnean species, replacing them by a large number of others founded on slight and unimportant differences, without taking into account the intermediate links between them. He considered that the drawback of this proceeding consisted in attaching too great an importance to mere details, and in relegating broad comparisons and generalities to the background. But although he held firmly to his own convictions, he generously appreciated the standpoint of those opposed to him, and if his criticism was often keen, it was neither bitter nor personal. Indeed, even while jealously guarding his own independence of judgment, his genial temperament would lead him to soften the expression of his opinions, and to meet his opponents with indulgent kindliness. To the humble worker and the newcomer in his own field he always extended a warm welcome.

Conchologists alone know how large is the debt their branch of science owes to Hippolyte Crosse, and it will not be forgotten that during a long life he clung to high ideals and unwavering principles. He was a spiritualist, in the philosophic not the popular sense, and

saw God in nature, repudiating the modern school, which would eliminate the Creator from creation. In private life, Crosse was greatly beloved and esteemed ; though devoted to scientific studies, he took a keen interest in literature, history and political economy and was a lively conversationalist, as well as a ready listener and charming companion. His interest in public events, particularly during the Franco-Prussian war, was manifested during a long series of years, when he repeatedly held the mayoralty of the district of Vernou, in which lies Argeville, an estate which has been in the Crosse family for several generations. His home life was of the happiest; his mother, his wife and four daughters, and a large circle of ever-welcome friends forming delightful and congenial surroundings to a man who was as affectionate as he was studious. In later years a rapid series of domestic afflictions, which he bore with great outward calm, quickly undermined his seemingly robust constitution.

Two apparently slight accidents brought about the fatal illness which cut him off in the midst of perfect physical and intellectual activity. Even when he knew that death was inevitable he continued to work as had always been his habit and thus for some time succeeded in hiding the fact of his dangerous condition from his own family. Until the last he laboured to set his affairs in order and sought to terminate the work he had still to do. Not long before the end came, he expressed his regret that there would be no one of his name to inherit and profit by the scientific treasures he had amassed. He made arrangements to bequeath to the son of his old friend Paul Fischer, the property as well as the editorship of the *Journal de Conchyliologie*, and on the 7th of August, 1898, he closed a long life of honour and usefulness.

His devotion to science was completely disinterested; honours came unsought and unasked, but perhaps they were rarer and less distinguished than they might have been had he not been proudly tenacious of his strictly religious and conservative views. His reputation, however, did not suffer, in spite of his exceptional modesty; he had earned a great name in the scientific world and those who now mourn his loss belong to all nations and all countries.

Fusi on the Norfolk Coast.—The neighbourhood of Cromer is not at all favourable to the conchologist, and I was agreeably surprised to find on the beach at Sherringham this summer a large number of *Fusi*, along with the specimens of *Buccinum undatum*, thrown away by the fishermen in clearing their nets. *Fusus antiquus* was, of course, most plentiful, but *F. gracilis* and a smaller species, probably *F. propinquus*, were also among them. I also secured a very fine *Saxicava rugosa* embedded in the hardened chalk on the foreshore.—CARLETON GREENE. (*Read before the Society*, Nov. 9th, 1898).

REMARKS ON THE CAUSE OF ABNORMALITY IN PLANORBIS SPIRORBIS.

By R. STANDEN.

(Read before the Society, Nov. 9th, 1898).

Mr. A. G. Stubbs, in his interesting paper (*vide* p. 106-108 *antea*) on the remarkable assemblage of monstrous shells from a ditch at Tenby, makes a suggestion as to the possible cause of this phenomenon, which distinctly merits consideration. But it has occurred to me that the same cause would equally apply to other ditches, and yet I do not know of any similar abnormalities occurring in such profusion elsewhere, although individual cases of distortion in *Planorbis spirorbis*, etc., are by no means uncommon, as the experience of most collectors will show. The statement that they only occur in a restricted area of this particular ditch, made me curious to investigate the general fauna of that area more fully, and on communicating this desire to Mr. Stubbs, he very kindly sent me a number of living *P. spirorbis*, both normal and abnormal, in all stages of growth, together with samples of the aquatic vegetation.

On placing these in a tank, I soon noticed that all the shells were more or less covered with a flocculent growth, which a pocket lens resolved into luxuriant colonies of *Epistylis anastatica*, one of the rigid-stalked Vorticellidæ. Closer microscopic examination showed that the needle-like stalks of this organism form dense spiky tufts, and each stalk is furthermore studded with numbers of diatoms, which add to the rigidity of the mass. On carefully examining the points where the whorls of the shells first show a tendency to scalarity, more especially in young examples, I was quite satisfied that this growth of *Epistylis* is the primary cause of abnormality in the Tenby specimens. During the resting periods which intervene between the successive "growth stages" of the shell, the *Vorticellæ* increase rapidly, and cover every portion; and should a vigorous colony chance to locate itself in the suture immediately at the junction of the mouth and whorl, especially when the shell is quite young, the animal, on commencing to add a new portion to its shell, is confronted by a prickly living bush—which, doubtless, possesses some irritant or stinging power as well—and is obliged to carry on the construction of its shell at a tangent, in order to avoid the interfering parasite. In this way the regular coiling of the shell is interrupted, and it twists off into all manner of eccentric forms, as is so admirably shown in the plate accompanying Mr. Stubbs' paper.

These observations were further confirmed on receiving another large consignment of shells taken, at my suggestion, from different

parts of the ditch, and carefully kept separate. From those portions of the ditch where no abnormalities occurred, although the shells were equally abundant and the conditions of life apparently the same, the specimens were all exceptionally fine, and very clean, with no trace whatever of *Epistylis*.

The presence of this Vorticellid on shells of *Limnæa* and *Physa*, especially in their earlier stages, may also account for those occasional scalarid or other monstrous forms noted as occurring along with the deformed *Planorbes*, for I noticed plenty of colonies on shells from the infected area, whilst specimens from other parts of the ditch were quite normal, and free from this parasitic growth. It would be interesting if collectors would look out for and note the presence of *Vorticellæ* on shells from ditches where abnormalities, particularly of *P. spirorbis*, occur.

Vertigo moulinsiana Dupuy, **in Cambridgeshire.**—At the annual meeting, on October 22nd, I had the privilege of exhibiting a set of this rare *Vertigo*, received from my friend Mr. J. R. B. Tomlin, of Llandaff, and collected by him in the early part of September last, at Wicken Fen, near Soham. This discovery possesses a peculiar interest, inasmuch as it proves the correctness of the late Dr. J. Gwyn Jeffreys' surmise that *V. moulinsiana* would probably be found to exist in the fen districts of our eastern counties, if careful search were made (Brit. Conch., vol. 1, p. 256). It is also a valuable addition to the limited number of recorded localities for the species in the United Kingdom. Mr. Tomlin informs me that he was searching for Coleoptera in what now remains of this once famous fen, and whilst beating the reed-stems, and shaking bundles of freshly-cut sedges over a newspaper, he found the *Vertigo* in some quantity. He considers that it would be found abundantly by any assiduous collector, who had time to systematically search amongst the reed-beds and sedges—"sedge" being the fenman's comprehensive term for the luxuriant undergrowth that characterises this fen, and comprises a large variety of tall plants and grasses. The animal seems to be of a sluggish disposition, living exposed on the tall plants during the summer and autumn, and probably hibernating in hollows of the dead stems during the winter months. The Wicken habitat is very similar in some respects to that in which the mollusc was discovered by Mr. C. O. P. Cambridge, at Morden, Dorset, in 1889 (*J. Conch.*, vol. 6, p. 348, April, 1891).—R. STANDEN (*Read before the Society*, Nov. 9th, 1898).

Helices abandoning their Shells.—Referring to the observations on *Limnæa peregra* abandoning its shell (*vide supra* pp. 112, 164), I have had a somewhat similar experience with certain *Helices*. My friend, Mr. F. J. Bigger, collected for me a number of shells, during April, 1898, from the walls of a hotel on the Grand Canal, Venice. Many were quite young specimens of *Helix pisana* Müll., and *H. lactea* Müll., which I fed all summer on lettuce, upon which they throve and appeared healthy. In October, when the shells were about three-quarters grown, I noticed that one of the animals had crawled out of its shell and was wandering over the lettuce leaves. About a month later I took the shells to the Annual Conversazione of the Belfast Naturalists' Field Club, and during the evening another animal also left its shell. The box in which I kept them was covered with glass, and they were not handled in any way.—R. WELCH (*Read before the Society*, April 12th, 1899)

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

279th Meeting, April 12th, 1899.

Mr. Thos. Rogers in the chair

Donations to the Library announced and thanks voted :

The Irish Naturalist, vol. 8, no. 4 ; the Scottish Naturalist, no. 30, April ; the Naturalist, no. 507 ; Science Gossip, vol. 5, no. 59 ; La Feuille des Jeunes Naturalistes, ser. 3, no. 342 ; Journal de Conchyliologie, vol. 46, no. 3 ; the Nautilus, vol. 12, no. 11 ; Transactions of the Academy of Sciences of St. Louis, vol. 7, nos. 17-20, and vol. 8, nos. 1-7.

New Members Elected.

Mrs. Jessie M. Blundell, Argyll House, Cirencester.

Mrs. Lucy A. Smith, Cricklade Street, Cirencester.

Mr. G. E. Mason, 11b, Stanford Place, Stanley Bridge, Fulham, London, S.W.

Mr. G. M. Morris, 18, Northen Grove, West Didsbury, Manchester.

Mr. J. E. Neild, Brookville, Gilda Brook Road, Eccles.

Candidates Proposed for Membership.

Mr. J. C. Blackshaw ; Mr. H. Lamont Orr.

Member Deceased.

Mr. Leonard F. Biddle, who only joined the society in 1898 ; he had, however, occupied the position of hon. secretary to the Liverpool Naturalists' Field Club for the last two years, during which time he succeeded in winning the highest esteem and respect of the members. The Conchological Society had formed high expectations of his work as a member, and deeply regrets his early decease.

Letter Read.

From the Rev. G. A. Frank Knight, of Almanarre, Garelochead, who wishes to call attention to the scheme of work drawn up by the Zoological Section of the Committee charged with making arrangements for the Meeting of the British Association at Glasgow in 1901. He will be glad if any members who have any information regarding Clyde dredgings, or who are in possession of private lists, will enter into communication with him.

Papers Read.

" Helices abandoning their Shells," R. Welch.

" A large colony of *Vertigo antivertigo* Drap., in Co. Down," by R. Welch.

" Note on *Clausilia semidenticulata* Pfr.," by J. Bliss.

" Effect of protracted drought on the occurrence of Land Mollusca," by the Rev. J. W. Horsley.

" Belgium and the Ardennes," by the Rev. Carleton Greene.

Exhibits.

By Mr. R. Welch: *Helix lactea* and *H. pisana* to illustrate his paper ; also *Vertigo antivertigo* and *Carychium minimum* from Shaw's Bridge, River Lagan, Co. Down; *Planorbis nautileus* var. *crista*, and monstr. *scalariforme*, collected by Mr. H. L. Orr, during September last, from a drain at Groomsport Harbour, mouth of Belfast Lough, where the variety *crista* occurred in countless thousands on duck-weed; *Vertigo pygmæa*, *V. antivertigo*, *V. edentula*, *Carychium minimum*, *Succinea elegans* var., and *Hyalinia nitida*, collected by the Hon. R. E. Dillon, at Clonbrock, Co. Galway.

By Mr. R. Standen: A fine example of *Cypræa isabella-mexicana* Stearns (E. Coll. F. L. Button), dredged at Clipperton Island, 600 miles off the American coast.

By Mr. Bartlet Span: A series of *Turritella terebra*, type and varr. *nivea* and *gracilis* from Milford Haven.

By Mr. L. J. Shackleford: A series of *Buliminus dux* Pfr. from Israelite Bay, S. Australia.

By the Rev. Addison Crofton: *Turritella terebra*, varieties and local forms, from Whitebank and Giltar, Tenby; Milford Haven; Isle of Man; and Scalloway.

By the Rev. H. A. Hudson: *Turritella terebra* from Red Wharf Bay and Tenby.

By Mr. J. D. Dean: *Helix nemoralis*, varr. *rubella* and *castanea*, from Mappleton, Derbyshire; and *H. hortensis* var. *arenicola*.

By Mr. R. Cairns: *Bulimus auris-vulpina* from St. Helena; and *Dentalium abyssorum*.

By Mr. F. Taylor: *Ampullaria pinei* Dall.; and *Unio pinei* Wright, newly described species from Aripeka, Florida.

280th Meeting, May 10th, 1899.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted:

The Irish Naturalist, vol. 8, no. 5; the Naturalist, no. 508; Science Gossip, vol. 5, no. 60; the Journal of Malacology, vol. 7, no. 2; La Feuille des Jeunes Naturalistes, ser. 3, no. 343; Journal de Conchyliologie, vol. 46, no. 4, and vol. 47, no. 1; the Nautilus, vol. 12, no. 12; Proceedings of the Royal Society of Queensland, vol. 14; Marine Shells from the Andaman Islands, by J. C. Melvill and E. R. Sykes; Vie et Travaux de Joseph Charles Hippolyte Crosse, by Messrs. Poyard and Fischer; Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 43, part 1.

New Members Elected.

Mr. Hugh Lamont Orr, 29, Garfield Street, Belfast.

Mr. James C. Blackshaw, 158, Penn Road, Wolverhampton.

Candidate Proposed for Membership.

Mr. Frederick Darnbrough.

Member Deceased.

Mr. Sylvanus Hanley.

Papers Read.

"A contribution towards a list of the land and freshwater mollusca of Cumberland and Westmorland," by W. J. Farrer.

"Obituary notice of the late Joseph Charles Hippolyte Crosse" (adapted from the French memoir of C. Poyard and H. Fischer), by Clara Nördlinger.

"Note on the genus *Herviera*," by J. Cosmo Melvill and R. Standen.

Exhibits.

By Captain W. J. Farrer: An interesting series of the more notable species and varieties mentioned in his paper.

By Mr. R. Cairns: *Herviera isidella* M. & S., *H. gliriella* M. & S., and *Cæcum vertebrale* Hedley, all from Uvea, Loyalty Islands; *Helix trailli* Pfr. from Borneo; a large series showing considerable variation; and a stunted form of *Limnæa stagnalis* L., with inflated lip, from Hurst, Ashton-under-Lyne.

By Mr. F. Taylor: A series of remarkably fine *Paludestrina jenkinsi*, and its variety *carinata*, from the canal at Droylsden, Lancs. This is the first record of the occurrence of this shell in Lancashire.

On behalf of the Manchester Museum were shown some very choice examples in perfect condition of the gigantic *Lunatia lewisi* Gould, from California; *Cardium hians* Brocchi, from Algiers; *C. costatum* L., from East Africa; and *C. ringens* Ch., from Gambia.

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The Nautilus, vol. 12, nos. 11, 12, March and April, 1899.

"Catalogue of the Amnicolidæ of the Western United States," by H. A. PILSBRY [5 nn. spp.]. "On a new species of *Drillia* [*D. empyrosia*] from California," by W. H. DALL. "New Pupidæ," by V. STERKI [*Bifidaria quadridentata*, *B. sonorana*, New Mexico]. "Another new snail from New Mexico," by T. D. A. COCKERELL [*Ashmunella pseudodonta* n. sub-sp. *capitanensis*].

"On a recent collection of Pennsylvanian mollusks from the Ohio river system below Pittsburg," by S. N. RHOADS [47 spp.]. "A new *Pteronotus* [*Pt. carpenteri*] from California," by W. H. DALL. "How Uniones emigrate" [carried by birds], by L. S. FRIERSON. "Description of new American land-shells" [*Gastrodonta cœlaxis*, N. Carolina; *Polygyra postelliana subclausa*, Florida].

Journal de Conchyliologie, vol. 46, no. 3 [dated "1er Juillet, 1898," received March 23rd, 1899].

"Etudes malacologiques sur des genres nouveaux ou peu connus; 5, sur les genres *Xenothauma* et *Platybostryx*," by H. CROSSE. "Descriptions d'espèces nouvelles de mollusques provenant de l'archipel de la Nouvelle-Calédonie (Suite)" [*Mitra* 3 nn. spp. figured], by J. HERVIER. "Description d'une espèce nouvelle de *Plectopylis* [*P. françoisi* Tonkin], by H. FISCHER. "Note sur le *Pleurotomaria Beyrichi*," by PH. DAUTZENBERG et H. FISCHER [figure, with summary of other species]. "Description de coquilles fossiles des terrains tertiares inférieurs (Suite)," by C. MAYER-EYMAR.

Vol. 46, no. 4 [dated "1er Octobre, 1898," received April 19th, 1899].

"Descriptions d'espèces nouvelles de mollusques, provenant de l'archipel de la Nouvelle-Calédonie (Suite)" [*Triforis*, 29 forms re-described and figured], by J. HERVIER. "Quelques remarques sur les moeurs des Patelles," by H. FISCHER.

Vol. 47, no. 1 ["1er Trimestre, 1899. Sorti des presses le 28 Avril, 1899," received May 3rd, 1899].

"Hippolyte Crosse: Notice biographique," par C. POYARD; "Œuvre scientifique," par H. FISCHER [with portrait]. "Description de coquilles nouvelles de l'Indo-Chine" [*Helix*, 6 spp.; *Clausilia*, 7 spp.; *Pupina*, 3 spp., figured], by A. BAVAY and PH. DAUTZENBERG. "Note sur la présence du genre *Melampus* [*M. exiguus* Lowe, figured] dans le Golfe de Gascogne," by H. FISCHER. [It is with particular satisfaction that we notice the statement regarding the actual date of publication of the Journal. This is an innovation which will win the approval of all conscientious and accurate workers].

The Naturalist, no. 506, March, 1899.

"Extracts from a conchologist's note-book: 4, from Selby to Camblesforth and Gowdall, for *Limnæa glabra*," by W. NELSON.

The Irish Naturalist, vol. 8, nos. 3-4, March-April, 1899.

"The Brachiopoda and Mollusca of the Carboniferous Rocks of Ireland" [general sketch], by A. H. FOORD.

The Annals of Scottish Natural History, no. 30, April, 1899.

"*Vertigo pygmæa* and other molluscs in Perth E.," by W. EVANS.

Transactions of the Academy of Science of St. Louis, vol. 8, no. 5, March 1898.

"The molluscan fauna of western New York," by F. C. BAKER [We observe with regret that the author publishes the name of a new species without any description; this course of action is responsible for endless trouble in the past].

La Feuille des Jeunes Naturalistes, ser. 3, nos. 342-343, April-May, 1899.

"Révision des Pleurotomes éocènes du bassin de Paris" (Suite), by E. DE BOURY.

Science Gossip, vol. 5, nos. 59-60, April-May, 1899.

"Molluscs in Asia Minor," by J. BLISS. "*Pirula nodulifera* in North Kent," by J. P. JOHNSON. "Armature of helicoid land-shells, and new forms of *Plectopylis*" [*P. congesta* Tonkin], by G. K. GUDE. "Notes on mollusca at Reigate, Surrey," by R. ASHINGTON BULLEN.

Notes on a Third Collection of Marine Shells from the Andaman Islands, with descriptions of three new species of Mitra, by J. C. MELVILL and E. R. SYKES [list of 59 forms, 3 nn. spp. figured].

Vie et Travaux de Joseph Charles Hippolyte Crosse : Notice biographique par C. POYARD ; Œuvre scientifique par H. FISCHER.

The Journal of Malacology, vol. 7, no. 2, May, 1899.

"The specific position of the reputed British *Hyalinia glabra* Studer" [the British form is *not H. glabra* of Studer], by W. MOSS. "Notes on the species of *Ennea* and *Leptopoma* recorded from Ceylon, etc." [6 nn. spp. figured], by E. R. SYKES. "*Phasianella* '*pulla*' or '*pullus*'" [latter is correct], by A. H. COOKE. "On the occurrence in Ireland of *Arion empiricorum* Fér. var. *bocagei* Simr.," by W. E. COLLINGE. "Species of *Plectopylis* recently described in 'Science Gossip,'" by G. K. GUDE. "Mollusca of Grange-over-Sands" [additions to Standen's list, *J. Conch.*, p. 113 *supra*], by H. V. FOWLER. "Note on some slugs from Teneriffe," by W. E. COLLINGE and F. J. PARTRIDGE.

NOTE ON THE GENUS HERVIERA.

BY J. COSMO MELVILL AND R. STANDEN.

(Read before the Society, May 10th, 1899).

REFERRING to the description of this genus (p. 185, supra), we wish to call attention to the fact that Le Père Jean Hervier, of Lyon, after whom it was named, is the conchologist of this distinguished family. We inadvertently gave the designation and residence of his cousin, the Abbé Joseph Hervier, of St. Etienne, the well-known botanist, after whom *Trifolium hervieri*, *Hieracium hervieri*, etc., are called. We regret that, misled by the exact similarity of initial, we unwittingly created a confusion we now seek, by this note, to rectify.

We may add that further examples of both *H. gliriella* and *H. isidella* have lately been found by Mr. R. Cairns amongst shell-shingle forwarded from Uvea.

Vertigo alpestris Alder **in Lancashire.**—This extremely rare shell does not appear to have been taken by any Lancashire conchologists since Gilbertson's record of "Clitheroe in Lancashire" quoted by Jeffreys (Brit. Conch., vol. 1, p. 260). It is, therefore, noteworthy that during the summer of 1898, Mr. F. C. Long, of Padiham, took it amongst moss at the foot of an old wall in the Roughlee Valley, Pendle Forest, and has kindly given me the opportunity of exhibiting it at this meeting.—R. STANDEN (*Read before the Society*, Jan. 11th, 1899).

ADDITIONS TO "BRITISH CONCHOLOGY."

(Continued from page 171).

By J. T. MARSHALL.

Odostomia *(continued).*

Sometimes, it may be, the artist has not caught the same aspect of the shell as the writer, and this itself might result in a considerable divergence from the type form. Only in this way can I account for some authors' figures differing so much from their written descriptions, instances of which will be pointed out in the following pages. Type forms, especially of such minute and uncharacteristic shells as the *Odostomiæ*, should be taken by photo-lithography, and in variable species several figures should be given to show the range of variation.

The working out of this extensive and interesting group I can recommend as a good mental exercise. I have studied it more or less for nearly forty years, and my mounted specimens do not number less than 20,000, collected from all parts of the British Isles and at all depths. Some of the species I have fully dealt with in previous papers. I do not profess that my notes thereon are more than an elucidation or confirmation of previous writers, nor that it contains much original matter, Jeffreys having left very little original work for gleaners on a subject in which he was *facile princeps*, and which he had made almost entirely his own. But I think it will be found that my records have considerably increased the area of distribution in the British seas of most of our species and varieties.

The following short characteristics of the more critical *Odostomiæ* will be found useful:—

O. minima.—Like a young *O. nitidissima.*

O. nivosa.—Cylindrical; spiral striæ round periphery.

O. truncatula.—Like a large *O. nivosa*; spiral striæ throughout.

O. clavula.—Short, tubular.

O. lukisi.—Like a stunted *O. conoïdea* with rounded base.

O. albella.—A long oval; slight umbilicus and tooth; thin.

O. rissoïdes.—Rounded whorls; rounded mouth; umbilicus and tooth slight.

O. pallida.—Short spire; long body-whorl; no umbilicus; solid.

O. conoïdea.—Grooved mouth; flattened whorls; keeled base.

O. acuta.—Conical; funnel-shaped umbilicus.

O. umbilicaris.—Like a stumpy *O. acuta.*

O. unidentata.—Like *O. acuta*, but no umbilicus; squarish base.

O. conspicua.—Like a large *O. unidentata*, with deeper suture.

O. turrita.—Like a dwarf *O. unidentata*, with narrow base.

O. plicata.—Long and slender; whorls compressed.

O. diaphana.—Thin, smooth, and glossy; shaped as *Limnæa glabra.*

O. obliqua.—Thin and spirally striated; shaped as *L. palustris.*

O. warreni.—Striated at base only; turreted whorls; shaped as *L. stagnalis.*

O. minima Jeffr.—5 to 90 f. in fine sand with an admixture of mud. Port Erin and Puffin Island (L.M.B.C.); Berehaven 5 f. (R.I.A. cruise); Roundstone Bay (Dodd)! Antrim (Chaster); Lismore, 6 f. (Knight)! N. and E. Sutherlandshire (Baillie)! St. Magnus Bay, 60—80 f. (Jeffreys); St. Aubin's Bay, Jersey; Guernsey and Sark, 15—20 f.; Scilly, 40 f.; Falmouth, 19 f.; Mount's Bay; Cawsand Bay, Plymouth, 12 f.; Oban, 25 f.; the Minch off Loch Boisdale, 20 f.; Raised beach, Skye (T. Scott)! Also from Sooloom Bay, Tripoli, (H.M.S. Shearwater)!

A scarce species, and very minute; but patient examination of fine dredgings with a microscope will not go unrewarded. In Jeffreys' description[1] he says the inner lip "is united with the outer so as to form a continuous but indistinct peristome," while in his text on the next page he says the contrary, so that on page 16, line 5, the word "nor" should be replaced by the words "and being." The characters of the peristome and umbilicus are uncertain, and appear to me mere individual variations; in both these respects it is similar to immature *Pherusa gulsonæ*, with which it has some affinity; but under a microscope the flexuous longitudinal striæ of *O. minima* will be found a marked character. Its general appearance is not unlike a young *O. nitidissima*, but it has a bulbous apex instead of a spiral one. This mite of a shell occurs in the post-tertiary estuarine clay at Magheramorne, on Larne Lough, where 60 specimens occurred in a quarter of a cubic inch of fine siftings (Praeger)! Dr. Jeffreys had previously identified one example found by Mr. Stewart in the same deposit. Some of Mr. Praeger's specimens are two or three times as large as the recent form, and have six whorls. It would thus appear that our little *Odostomia* has sadly degenerated.

Jeffreys' figure is a good one, though badly executed, but his micro. figure is not near it; nor is Sowerby's figure anything like. Good figures will be found accompanying the original description by Jeffreys[2]; it will be noted that the front one shows no trace of an umbilicus or chink, and it has a "complete continuity of the outer lip."

O. nivosa Mont.—In rock-pools at low water and dredged dead at all depths. Killala Bay (Miss Warren)! Lismore, 6 f. (Knight)!

1 *Brit. Conch.*, vol. 4, p. 115.
2 *Ann. Mag. Nat. Hist.* (3) vol. 1, p. 45, pl. 2, fig. 3, 1858

N. and E. Sutherlandshire (Baillie)! Sound of Sleat, 50—90 f., and Barra, 14 f. (Somerville and J.T.M.); Scilly Islands (Burkill and J.T.M.); Tenby and Caldy Island; Bantry Bay; Connemara; Achil Island; Portrush; Staffa; Iona; Rona; Oban; Thurso; S. and W. Orkneys; Vidlin Voe and off Lerwick, Shetlands.

The longitudinal sculpture of this species appears to have escaped observation. Fresh specimens have coarse longitudinal striæ, which are much stronger and puckered on the upper parts of the whorls, as in the next species; these disappear in dead or worn examples. In a few cases the spiral lines are absent from the base, and rarely the shell is conical. Specimens from Thurso are the largest, attaining a line in length. A distortion occurs in which the outer lip is expanded and there is a pronounced umbilicus, indicating aged specimens, and I have a scalariform monstrosity from the west of Ireland.

Jeffreys' figure is good as an outline, but his micro. figure is useless. Sowerby's is not sufficiently slender; neither is Forbes and Hanley's. Alder's original figure[1] (as *O. cylindrica*) is a fair one, but does not exhibit the peripheral striæ, though that is an error of the draughtsman, as he mentions it in his description.

O. truncatula Jeffr.—Exmouth (Coll. MacAndrew); Scilly Islands (Burkill and J.T.M.); Land's End; Falmouth and Helford; Torbay and Babbacombe Bay.

A very local but not uncommon species. There are two forms, one long and slender, the other short and broad, which I take to be the male and female. The striæ in fresh specimens are visible with an ordinary lens. Jeffreys says it is "not unlike the young of *Truncatella truncatula*," but a specimen of the latter the same size as *O. truncatula* has very convex whorls and a deep suture, being almost scalariform, whereas this shell has compressed whorls and a channelled suture. The broad or female form is more like *Acicula lineata*. From *O. nivosa* this differs in being more cylindrical, in consequence of the apex being blunter and the last whorl the same width as the preceding one. *O. truncatula* was first discovered by Mr. W. Rouse, of Plymouth, in 1849, and in the following year by Mr. R. Bolton of the same town and Mr. Barlee, when it was described by Gwyn Jeffreys[2] from specimens received from the latter gentleman.

Both Sowerby's and Jeffrey's figures are taken from what I consider to be the male or slender form; Sowerby's is the best, but the mouth is too large; while Jeffreys' figure is too spindled, and does not exhibit the conspicuous fold on the pillar. Forbes and Hanley's is most unreliable.

1 *Ann. Mag. Nat. Hist.*, vol. 13, pl. 8, fig. 14, 1844.

2 *Ann. Mag. Nat. Hist*, (2) vol. 5, p. 109, 1850.

O. clavula Lov.—6 to 90 f., muddy sand. Scilly Islands (Smart and others); S.W. Ireland, 5–79 f. (R.I.A. cruise); Antrim (Chaster); Gairloch, 30 f.; Loch Inver, 25 f.; and Sound of Sleat, 40—90 f. (Somerville and J.T.M.); Guernsey, 18 f.; Falmouth, 19 f.; Connemara, 12 f.; Brodick Bay, Arran, 40 f.; Loch Fyne, 27 f.; Loch Linnhe, 10 f.; Clyde, 18 f.; Eigg Island, 20 f.; Loch Broom, 15 f.; the Minch off Loch Boisdale, 15 f.; E. Shetlands, 40 f.

Var. **pistilliformis** Brugnone.—New to Britain. From Roundstone Bay, Connemara, 12 f., and Scilly Islands, 40 f. Rare in British seas, but less so in some parts of the Mediterranean. This is smaller, thinner, narrower, and more truly cylindrical, with the last whorl proportionally shorter and not projecting beyond the penultimate. It was first described by Brugnone as *O. pistillus* from a Monte Pellegrino fossil, but that name being preoccupied for a Japanese species by A. Adams, it was afterwards changed to *O. pistilliformis*. It is also *O. brugnoni* of Monterosato.

The British form of this species differs from the Mediterranean one in being larger, broader, more solid, less cylindrical, and less glossy, while Guernsey specimens have the whorls more compressed, a shallower suture, and an angulated base. A specimen from Loch Inver has the embryonic whorls exposed in a horizontal position on the summit. Jeffreys has remarked[1] that "this species is always distinguishable by having the shape of a short cylinder with a truncated apex," but his figure is too convex, the suture too deep, and the dimensions too large; it is a better representation of *O. lukisi*. Sowerby's is better in outline, but the mouth should be oval and contracted instead of expanded, and there should be a small umbilicus. Forbes and Hanley's is a good figure; but it is remarkable that in this, as in other species, there is no likeness between the three figures, and if compared together they appear as three species.

O. lukisi Jeffr.—Sea-weeds at low water to 95 f. Scilly Islands (Burkill and J.T.M.); Isle of Man (Leicester)! Lismore, 6 f. and Lynn of Morven, 50 f. (Knight)! Oban, 18—25 f.; Iona, 16—35f.; Loch Boisdale and Barra, 20 f.; Loch Inver, 25 f.; and Sound of Sleat, 40—95 f. (Somerville and J.T.M.); Jersey, Guernsey, and Herm; Penzance, low water; Borough Island and Torbay; Margate; Caldy Island; Roundstone Bay and Deer Isle, Connemara; Achill Island; Killala Bay; Lamlash Bay, 20 f.; Clyde, 18 f.; Knapdale Lochs, 11 f.

This species when alive or fresh is frequently marked with coarse longitudinal flecks of a chalky white. The apex is obliquely depressed and intorted, as in various other members of the genus, and often eroded. It ranges in outline from a cylinder to a short cone; its

1 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.* 1884, p. 345.

solidity and contracted mouth are constant characters, but it must be pronounced variable in shape and convexity of whorls. Some are quite as cylindrical as *O. clavula*, but the compressed whorls and conspicuous umbilicus of the latter will always distinguish them. Others closely approximate to forms of *O. rissoïdes*, but in these cases the smaller mouth of *O. lukisi* will separate them. A prevalent form from Torbay (of which the young are globose) is short and stumpy; and a dwarf form occurs at the Isle of Man and in South Devon. The finest come from Jersey, Margate, and Shetland, and attain a line and a half. It is more plentiful at Guernsey than elsewhere, where it was first discovered. Plenty of specimens are without the umbilicus, and that and the tooth are never so prominent as in Jeffreys' figure, which is otherwise a good one. Sowerby's figure (pl. 17, fig. 18) is not this species, but *O. rissoïdes*.

O. albella Lov.—Jersey to Shetland.

Var. **subcylindrica** Marsh[1].—Jersey and Guernsey; Scilly Islands; Bantry Bay.

This species is most abundant in the Channel and Scilly Islands, but rather scarce elsewhere. It is not a variable shell, although in outline it ranges from cylindrical to oval. It is of a dull glassy white, the liver-spot showing through in living specimens, and the peculiar generic nucleus always shows up well. It has a very small umbilicus or chink placed exactly opposite a very small tooth; neither tooth nor umbilicus, however, is always visible. A dwarf form lives under stones at Guernsey quite high up, with *Littorinæ*. A telescoped monstrosity comes from Scilly, and a decollated one from the same district and from Falmouth.

Jeffreys' figure is perfect; Forbes and Hanley's (as *O. rissoïdes* var. *albella*) is not near the mark, and why coloured brown it is hard to say; Sowerby's is nothing like.

O. rissoides Hanl.—Between tide-marks and dredged dead at all depths. This shell is extremely variable in size, comparative convexity of whorls, and shape; some are cylindrical, others oblong, conical, oval, and globose, but in all its many forms differing from the preceding and following species in its texture, deeper suture, and rounded aperture. The turreted whorls and deeper suture are its most constant characters. The tooth and umbilical chink, in the type and all the varieties, are of too variable a character to be relied upon, specimens of the same proportions and from the same localities showing one or both quite conspicuously, while in others they are obscure or altogether wanting. Jeffreys says that "in specimens which have a short spire there is a more or less developed chink or indentation,"

1 *J. Conch.*, vol. 7, pp. 252-3, 1893.

but the degree of development depends more on the convexity of the whorls—the more convex the whorls the deeper the umbilicus. There are several well-marked forms besides those indicated by Jeffreys as varieties. One is small, having the proportions and contour of *Rissoa pulcherrima*, a short spire and ample body-whorl; another, also dwarf, is like a short cylinder, with turreted whorls, and distinctly umbilicate. Both are from the Channel and Scilly Islands. The Shetland form is broader throughout, the young of which are globose.

The habitat of *O. rissoïdes* is unique and highly interesting. It is nearly thirty years since I first found them gregarious and commensal with *Mytilus edulis* at Teignmouth; a few years afterwards I found them under similar conditions at Exmouth, and I have subsequently found this to be general throughout South Devon. I have no doubt they will be found in similar situations elsewhere, though I have not been successful in the search, for dredged and dead specimens occasionally exhibit fragments of the byssi of *Mytilus* attached to them. It is true they are frequently found in the weeds of rock-pools on most of our shores, but these are small and stunted, and do not attain half the size of those above mentioned. The colonies of *M. edulis* in which they occur are generally situated about the middle of the littoral zone, and are so densely matted together as not to be easily disintegrated; but, an opening once made, the *O. rissoïdes* may be seen absolutely swarming underneath in a thin stratum of mud, very often themselves anchored or entangled in the byssi. None of the varieties occur with it, but all belong to the typical form, and attain two lines in length, the largest I have seen, and distorted examples are not uncommon, probably the result of overcrowding. Nor do any other genera of mollusca associate with them except an occasional *O. pallida*, which is notoriously a commensal species. There is, however, a fair assortment of other marine life associated with them in this curious environment, comprising small crustacea, annelides, &c. Another curious fact is that the *Odostomiæ* do not affect all colonies of mussels alike, nor a tithe of them, but appear to be most capricious in their choice, choosing one patch of mussels and neglecting a dozen others in their vicinity. I have never found them in a bed of adult mussels, but generally where these were half grown.

Var. **alba** Jeffr.—6 to 45 f. Scilly (Smart and others); Lismore, 6 f. (Knight)! Sound of Sleat, 45 f. (Somerville and J.T.M.); Sark; Plymouth Sound; Borough Island; Torbay; Connemara and Mayo; Iona, 20 f.; Aberdeen; Dornoch Frith; the Minch, 45 f.; Hascosy Sound, E. Shetland, 10f. This is very different in aspect to the type, and much smaller; the mouth is more oval, the whorls spindled, and the tooth and umbilicus rather more constant and distinct. It is a scarce

variety. A small and slender form of it from Guernsey resembles *O. diaphana.*

Var. **nitida** Ald.—Scilly Islands; Skegness.

Var. **glabrata** F. & H.—Guernsey; Scilly; Torbay; Bundoran; Iona; Dornoch Frith.

Var. **dubia** Jeffr.—Frequently found with the type. There are several forms of it, ranging from a narrow to a broad oval, and the tooth and umbilicus are as variable as in the type. Its permanent characters are a shorter spire and a larger body-whorl, which gives it an oval outline.

Var. **exilis** Jeffr.—Jersey; Borough Island; Skegness; Puffin Island; Cumbrae; Arran; Iona. I am not quite satisfied with this variety. It appears to be rare, and resembles var. *alba* in its proportions, but in this the whorls are not spindled, and the suture is shallower. It must not be confused with *O. albella* var. *subcylindrica*, which it resembles; that has a slighter tooth and a smaller mouth; nor with a convex form of *O. plicata*; the latter has a smaller mouth and a sharper apex.

Among the numerous monstrosities and distortions to which this species is subject may be mentioned one with telescoped whorls, which is the most prevalent; another with scalar or with carinated whorls, a contracted or expanded aperture, a developed pillar lip; a rare one has a double outer lip, and four specimens from as many places have a fully developed canal on the pillar as in the genus *Lacuna.*

Jeffreys' figure of the type is perfect; unfortunately he does not figure any of the varieties, but his original figures of var. *alba*[1] are very good. Forbes and Hanley's figure is a fair one, but too compressed; their var. *alba* is nothing like; and their var. *dubia* was figured by error as *O. unidentata* var. *turrita*, and is not altogether bad, though the authors say in their Appendix "we do not like the figure;" but their *O. glabrata* and *O. nitida* are very good representations of Jeffreys' varieties. Sowerby's type figure is not good; the suture should be deeper, and the length given is too short by one-half; but his figure 18 (indexed as *O. lukisi*) is nearer the mark; those of vars. *alba*, *nitida*, and *dubia* are perfect; while his figure of var. *glabrata* is not that form, though figure 15 is.

O. pallida Mont.—Quasi-parasitic or commensal with various other mollusca. It has long been known in company with *Pecten*, and I have previously mentioned its association with *O. rissoïdes* among *Mytilus edulis* in South Devon, and with *Turritella terebra* in the Shetlands.

1 *Ann. Mag. Nat. Hist.* (2) vol. 2, p. 337, 1848; and (3) vol. 3, p. 113, pl. 3, f. 20 a, b, 1859.

Var. **crassa** Thomps.—Channel and Scilly Islands; Skegness; Clyde.

Var. **angusta** Jeffr.—Many places from Jersey to Shetland, not uncommon. Every gradation between this and the type is to be found. It is the prevalent form at Jersey, while a still more slender and smaller form, with compressed whorls and shallower suture, occurs at Guernsey and Scilly. I have the cylindrical monstrosity from Oban, and the turreted one from the Clyde.

O. pallida is almost as variable as *O. rissoïdes*, and some specimens will be found to run unpleasantly close to it; but it has a closer affinity to *O. albella*, especially through the var. *angusta*. There are two principal forms, a short-spired and a long-spired one; Jeffreys has figured the latter and made it his type, while Forbes and Hanley have adopted the short-spired form, although the latter is greatly in the minority. Specimens of Jeffreys' dimensions I have seen from Guernsey only; the usual size is a line and a half, but the majority are smaller. An elongated form has compressed whorls and an angular mouth, another has rounded whorls, while a variety from the Clyde is egg-shaped, with a very short spire and ample body-whorl, not unlike *Melampus bidentatus*. Throughout the different forms, the shallow suture and elongated mouth are pretty constant characters, and the shell is never so thin as *O. albella* or *O. rissoïdes*, the only British species likely to be confused with it. Jeffreys says the spiral striæ "may be detected with a lens of ordinary power," but only about twenty per cent. are so, even in the strongest light. Clark was more than usually mistaken in combining *O. rissoïdes* and *O. albella* with this as dwarf littoral varieties. Neither of the former are dwarfs, and on a fair comparison *O. pallida* cannot claim any preference in point of size. Perhaps this was as near as he could ascertain from his limited methods of observation, but more regard to their conchological characters would have shown him that these species differ in texture, sculpture, &c.

Forbes and Hanley's figures (as *O. eulimoïdes*) are fairly good of the short-spired form; Jeffreys' is better, but the base should be more pointed and there should be no umbilicus. Sowerby's type figure (12) is not good, having a round and projecting mouth, but his figure 13 (back view) is a good profile of the var. *angusta*. The figure of *O. crassa* in "British Mollusca" is a carinated monstrosity, and not Thompson's *O. crassa*, whose original figures in the Annals,[1] though not very good, give a fair idea of the shell.

Forbes and Hanley[2] adopted the name *eulimoïdes* for "what is usually marked in cabinets as the *pallidus* of Montagu, with whose

1 Ann. and Mag. Nat. Hist. ser. 1, vol. 15, p. 315, pl. xix., f. 5, 1845.
2 Brit. Moll., vol. 3, p. 273.

description, figure, and specimen it is decidedly at variance." And they say, regarding what they conceive to be *O. pallida*,[1] "As the apical whorls of the only existing type of *Turbo pallidus* Mont. have been broken off, we are only able to conjecture from analogy that it may belong to this genus. It resembles *O. insculpta*, but has a greatly more elongated spire. The specimen in the National Museum is not in such condition that we can assert its distinctness from any of the species we have described. Much uncertainty has always existed as to what Montagu really meant." Their figure of *O. pallida*, and Sowerby's copy of it in his "Index," do not help one. Jeffreys, on the other hand, gives evidence[2] for holding this as Montagu's *O. pallidus*, in which he seems to have been generally followed, and it would now be useless to guess what Montagu's *Turbo pallidus* is or was.

O. conoïdea Brocc.—10 to 90 fathoms, in muddy sand. Fossil in the Belfast deposit, one specimen (Praeger)! This is another variable species; none of its characters can be considered strongly marked except the grooved mouth, and that is visible in about thirty per cent. only. The convexity of the whorls, the depth of the suture, and the keeled periphery are exceedingly variable; the latter character varies from being strongly and sharply keeled to having a perfectly rounded base. The type is obtusely keeled; when sharply keeled, the base is pointed as Jeffreys describes, though his figure does not show it; and with regard to the "slight impressed line round the periphery," that is observable only in ten per cent. of the specimens, particularly in those with a sharp keel. It is, in fact, a line formed by the keel in the process of growth, and is sometimes observable not only on the periphery, but also at the base of the preceding whorls. The umbilicus, again, varies very much, the reflection of the inner lip sometimes partially and at other times wholly closing it. The tooth, however, is always strong and conspicuous. The apex of the shell is not inverted, but more or less exposed (when not worn down), as shown in Jeffreys' figure, though described by him as "concealed and twisted inwards." Very rarely in living examples a clear white band encircles the middle of the whorls. The structure of the shell is very brittle, and dead specimens rarely have the outer lip perfect. A pyramidal form from the Hebrides is nearly as broad as long. The operculum will be found a very pretty object under the microscope. Jeffreys' dimensions are too large; it does not often exceed two lines, and the usual size is a line and a half.

Var. **australis** Jeffr.—Connemara; Mayo; Iona; Shetlands. This merges insensibly from the type. One form of it, with rounded base and convex whorls, shorter spire and deeper suture, closely

1 *Op. cit.*, vol. 3, p. 306.
2 Brit. Conch., vol. 4, p. 126.

approaches *O. lukisi*, but the suture is not so shelving, and the mouth is larger and grooved. It brings the two species, however, very close together. Although Jeffreys gives this variety as southern and the type as northern, both forms are sometimes found in opposite places. For instance, I have the type from Scilly and the variety from various northern localities. In reality the difference between ordinary northern and southern specimens is hardly sufficient to separate the latter as a distinct variety, for many of those from southern localities will be found to have the same proportions as typical northern specimens. But there is a smaller and still more slender form that would have better merited the varietal distinction. It is only a line in length, proportionally narrower than var. *australis*, and is analogous to *O. acuta* var. *gracilis*; it is rather scarce, but occurs at Jersey, the west of Ireland, the Shetlands, and a few intermediate places. I consider *O. tenuis* of Jeffreys[1] to be another form of *O. conoïdea* var. *australis*. It has no permanent character but that of size to mark it off as a separate species, all those assigned to it by the author being, in my opinion, individual variations only. It is not a thin shell, as its name implies, but is solid for its size, though brittle. Jeffreys' figure of *O. tenuis* is nearly correct, but the tooth should be stronger and it should have a small umbilical chink. Besides the two stations recorded by Jeffreys, it was dredged at six others by the "Porcupine" Expedition, in some cases in company with *O. conoïdea*, and the two can be graduated to each other without difficulty. Jeffreys' figure of the type is perfect; Forbes and Hanley's answers better for the var. *australis*; Sowerby's is good, but is minus the umbilicus.

O. umbilicaris Malm.—10 to 60 fathoms, in fine and muddy ground. S.W. Ireland, 37 f. (R.I.A. cruise); Tan Spit, Cumbrae (A. Brown); Gairloch, 30 f., and Loch Inver 25 f. (Somerville and J. T. M.); Liverpool Bay, 12 f.; Knapdale Lochs, 11 f.; Tan Spit, 10 f.; Lamlash 17 f.; Clyde 18 f.; Skelmorlie 15 f.; Iona 20 f.; Loch Linnhe 27 f.; Glenelg 60 f.; Loch Broom 30 f.; W. Orkneys 45 f.; E. Shetlands 22 f.

Var. **elongata** Jeffr.—Skelmorlie 15 f.; Lamlash 17 f.; Gairloch 30 f.

This is a very rare species, and none of the foregoing localities yielded more than two or three specimens. It is most like a stumpy *O. acuta*, but the latter is more solid and conical, the whorls less tumid, and the last whorl smaller proportionally. It appears to have the same affinity to *O. acuta* as *O. lukisi* has to *O. conoïdea*. There is some variability in the convexity of the whorls and the corresponding depth of the sutural lines, and the apex is not always inverted, but as

1 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.*, pp. 347-8, pl. 26, fig. 4, 1884.

often exposed as in the last species. In Sowerby's and Jeffreys' figures the tooth is much too prominent; it is really small, though sharp and distinct.

O. acuta Jeffr.—Tenby; Scarborough; Doggerbank; Dornoch Frith; Stornoway.

Var. **gracilis** Marsh. (*J. Conch.*, vol. 7, p. 253, 1893).—Found occasionally with the type, from Jersey to Shetland. It is figured in "British Mollusca" and in Sowerby's "Index" (pl. xvii., f. 4). The Jersey form of this variety has flattened whorls and finer sutural lines, and may easily be confused with a similar form of *O. conoïdea* from the same district.

Var. **attenuata** Marsh. (*Ibid.*)—Guernsey 20 f.

This is one of the least variable species in the section. The principal character is the umbilicus, the entrance to which is funnel-shaped, owing to the reflection of the inner lip, but, as in other species, differing in degree. The spiral sculpture can be seen in fresh specimens only, and in a good light. The peripheral keel is indistinct in the adult, and the base is always more or less rounded. The suture is sometimes deeply excavated, especially between the lower whorls, and occasionally specimens of the type and of var. *gracilis* have compressed whorls and a shallow suture. Living examples from Torbay are flesh pink, and, like many others of the genus, aged specimens develope a peritreme and a deeper umbilicus. Some are found minus the top whorls and with the opening plugged up; one from the Clyde, having only two whorls left, still contains the animal; and there is a dwarf form about one-fourth the size of the type. Examples possessing a grooved aperture must be very rare; Clark has noticed it from Exmouth, Jeffreys had one from Falmouth, and I have another from the Mediterranean of the var. *gracilis*. Jeffreys' figure should have a broader base, a more conspicuous umbilicus, and the sutural lines less sloping; Forbes and Hanley's are better; and Sowerby's are capital representations of the two extreme forms.

(To be continued).

Clausilia (Alinda) biplicata H. and A. Adams var. **alba** nov.—Amongst a series of *Clausilia biplicata* exhibited at the September meeting by Mr. W. Moss, were two examples of a white form which, as I cannot find any previous record of its occurrence, I propose to call var. *alba*. The specimens, which were alive when taken, have been perfectly cleaned, and are lovely objects; transparent white, shewing under the lens the typical markings quite distinctly. They were sent to Mr. Moss by Mr. G. E. Mason, to whom they were given by a friend who picked them them up near the Thames at Mortlake. where the species occurs in great abundance, associated with a few *Cl. perversa*. Mr. Mason found another living white example on July 5th.—R. STANDEN (*Read before the Society*, September 13th, 1899).

NOTES ON THE CAPUT-SERPENTIS GROUP OF THE GENUS CYPRÆA.

By J. COSMO MELVILL, M.A., F.L.S., and ROBERT STANDEN.

(Read before the Conchological Society, December 14th, 1898.)

Eleven years ago, in the "Survey of the Genus Cypræa,"[1] the sequence of the group of certain of the section *Aricia*, was thus given:

C. moneta L.	*C. caput-serpentis* L.
C. obvallata Lam.	*C. caput-draconis* Melv.
C. annulus L.	*C. mauritiana* L.
C. caput-anguis Phil.	*C. arabica* L.

Of these *C. caput-anguis* was a doubtful species, and should, we think, have been classed as a variety of the common *C. caput-serpentis*; except for this little change, the order need be in no way altered. A pure white variety of *C.-serpentis*, recently acquired by one of us, serves as a fresh and closer connection with *C. annulus* and *C. moneta*, whilst the Australian variety of the same species, with more or less straight sides and dorsal convexity, links the type superficially with the distinct *C. caput-draconis*, this again being basally, except in size, an almost complete replica of the larger *C. mauritiana* L.

C. caput-anguis Phil.[2] was unfortunately not figured, nor do we know where the type is located. Accordingly, it must be *to some extent* uncertain whether a specimen relegated to this obscure "species" is rightly named.

In a most instructive paper[3] Mrs. Agnes F. Kenyon maintains that two small specimens in her possession are the true *C. caput-anguis* Phil. She figures them, both dorsally, laterally, and basally, and compares them with the larger Cowry, from the Sandwich Isles and Australia, which has been at various times regarded as *C. caput-anguis*. They agree with the dimensions and coloration given by Dr. Philippi, and we consider it very possible she has lighted on his species, but, even if so, we are by no means sure of its real distinctness from *C. caput-serpentis*. We are sorry Mrs. Kenyon's examples are no longer in this country, and that we had not an opportunity of comparing them minutely with others. We cannot, however, see (from the figures[4]) that the shell is "more oblong and pyriform in shape" than the variety of *C. caput-serpentis*, also figured.[5] The dorsal surface appears similar in both forms; the base, however, being more convex in

1 *Manchester Memoirs*, ser. 4, vol. 1, p. 184-252, 1888.
2 *Zeitschr. f. Malakozool.*, Jahrg. 6, p. 24, 1849.
3 *Proc. Mal. Soc.*, vol. 3, p. 77, 78, 1898.
4 *Op. cit.*, p. 78, fig. 1.
5 *Op. cit.*, p. 78, fig. 2.

the lesser-sized shell. Indeed, we are tending towards the opinion that Philippi described *C. caput-anguis* from an abnormally small individual, and, on this assumption, and also on the understanding that Mrs. Kenyon's shell is the form described by him, it seems to us most likely that the Australian and Sandwich Island form *is* this variety in normal state. In small individuals in our possession we note all the distinctive characters given in Philippi's description; the pale brown base, oblong shape, and brown staining between the teeth. In short, these three shells (*C. caput-anguis*, *C. caput-draconis*, *C. caput-serpentis*) are best known by their bases. We have examined large series from various collections, notably those of Messrs. Williams, Cairns, Rogers, Darbishire, as well as of the British and Manchester Museums, and our own.

At all events, *C. caput-anguis* Phil. seems very different from *C. caput-draconis* Melv., this latter shell being far more convex than any of its allies: straight both laterally, anteriorly, and posteriorly; sides not in the least degree laterally thickened, though sharply angled at the line of junction with the base at both sides; the interstices between the teeth dark; aperture, and flattened blackish base, precisely (as more than once mentioned) as in *C. mauritiana* L. in miniature; indeed, save in size, it has almost as near an affinity to this species as to any form of *C. caput-serpentis* L. The original type, collected by Captain Hungerford near Hong Kong, was, at the time of description, unique: but quite recently we have seen eight more examples, two of these are in our own possession, and two others, both juvenile, in that of Mr. J. M. Williams, of Liverpool; four are in the British Museum, South Kensington, from Easter Island, South Pacific, collected by Mr. S. V. Frank. All these eight examples have clearer dorsal markings than in the type, but as regards the straightness laterally, the dull leaden purple spaces at the interstices, and, above all, the flattened *mauritiana*-like base, aperture, and dentition, they are all precisely similar. We feel satisfied these are *specific* differences, though most probably all the members of this group spring from a common ancestor. Since writing the above, we hear from Mr. F. L. Button, of Oakland, California, that he lately had an opportunity of obtaining several examples of *Cypræa caput-draconis* in the market at San Francisco.

As to *C. caput-serpentis* L., the chief varieties are so well distinguished by Mrs. Kenyon, that we would refer all students of the Cypræidæ to her paper. The typical form hardly varies. We have one small, but full-grown example, and another the lateral expansion of which is unusually pronounced; a third with the dorsal spotting whiter than is common; and a fourth (the specimen figured in the

"Survey"[1]) having unusually clear cut white spaces surrounded dorsally by a well-marked network. The variety, so often referred to both by Mrs Kenyon and ourselves, as having been mistaken for the true *C. caput-anguis* Phil., seems now, as we have just said, to be a large form of Philippi's shell, and we think it is well to draw up the following brief description: which may serve to amplify and supplement the original one:—

(*a*) Var. **caput-anguis** Phil.

Testa ut in C. capite-serpentis typica, sed oblongiore; lateribus vix incrassatis vel angulatis; dorsaliter magis convexa; apertura latiore quam in typo; dentibus magnis, obtusiusculis, sedecim in labro utroque; basi cinereo-alba, vel pallidé brunneo-ochracea.

Hab.: Sandwich Isles (A. Garrett). Australia (Brazier, Mrs. Kenyon).

This is the form which is alluded to in the "Survey"[2] as being distinguished by a more rounded base, and slightly greater convexity of form from the typical series, and Mrs. Kenyon has expatiated at some length on this subject, besides figuring the shell in three positions.[3] We may add, that the surface never seems so highly polished in this variety as in the types.

(*b*) Var. **caput-colubri** Kenyon, *Proc. Mal. Soc.*, vol. 3, p. 79, fig. 3.

We quote the description in full:

"Shell warm fawn or light cream colour, the spots on the dorsal surface having the appearance of snow-white spots of irregular size; extremities tipped with white; the base white; the rich fawn colour of the margins extending about half-way across the convex base; teeth conspicuous white; interior white, in contradistinction to the violet hue of the interior of *C. caput-serpentis*.

Long. 27, lat. 20 mm.

Hab.—Hawaiian Islands and Lord Howe Island."

In the Saul collection, now at Cambridge, are the following modifications of this variety:—

(1). Large yellow, fulvous, otherwise typical.

(2). Smoky grey, very shining.

(3). Pale brown, almost subtransparent.

A fourth variety, acquired by one of us from Mr. G. B. Sowerby, without locality, is pure white, the dorsal spots just appearing, though much obscured, and might easily be mistaken for the var. *icterina* of *C. moneta* L., next to which this species was placed in the "Survey."[4]

1 *Manchester Memoirs*, ser. 4, vol. 1, pl. 1, fig. 2, 1888.

2 *Op. cit.*, p. 214.

3 *Proc. Mal. Soc.*, vol. 3, p. 78.
Manchester Memoirs, ser. 4, vol. 1, p. 207, 240, 1888

This may possibly be the *C. albella* of Lamarck. In the Williams and Standen collections are some very beautiful, highly polished, whitish, smoky grey coloured varieties. In that of Miss Saul, which we recently inspected, in the Zoological Museum at Cambridge, there also are a few examples of a very juvenile state of *C. caput-serpentis*, with a broad transverse brown zone stretching across the dorsal surface.[1]

C. mauritiana L.

A species not very prone to vary. After inspection of a very large series, we only observe (*a*) a fine form similar to the var. *theriaca* of *C. pantherina* L., the dorsal ornamentation being almost, if not quite, obliterated by a dark chestnut or black-brown suffusion: (*b*) a semi-pellucid olivaceous horny shell, the dorsal surface, with its usual ornamentation, standing out strikingly against a paler ground, while the basal sculpture is also of the same olive-corneous hue. This colour variety we propose to designate as :—

Var. **calx-equina** nov.

Hab.: Isles of the Pacific.

To sum up, it will be seen that no change, save one, is necessary in the sequence quoted at the commencement of this paper, and that what might have been considered a rather wide gap, viz.: that between *C. caput-serpentis* and *C. annulus*, has been bridged over by the discovery of the pure white form of the var. *caput-colubri*, to which attention has been drawn above.

[We may note here that our opinion has for some years been in favour of reducing the three Cowries, *C. moneta*, *C. obvallata*, and *C. annulus*, to forms of one variable species, to which the aggregate name of *moneta* might be applied. This has, in fact, been lately carried out in the labelling of the series in the British Museum by Mr. Edgar A. Smith. *C. icterina* Lamk., being universally considered a large, elongate, smooth form of *C. moneta*, shows a distinct transition to *C. annulus*, while *C. obvallata* exhibits the same from a different point of view, since it is connected with the normal tuberculated form of the Money Cowry, the yellow central dorsal linear ring being conspicuous, as in *C. annulus*, while absent from *C. moneta*, in all its forms.

As will be seen by a reference to former remarks on the subject (*op. cit.* p. 207) these three were only kept separate in the "Catalogue of the Species and Varieties of *Cypræa*" for the sake of convenience and on account of long usage.—Note added Sept. 12, 1899].

1 *Vide* Sowerby, "Thes. Conch.," Cypræidæ, pl. 37, fig. 539.

THE LAND AND FRESHWATER MOLLUSCA OF SOMERSETSHIRE.

(Continued from page 202).

By E. W. SWANTON.

Planorbis carinatus Müller. — Rare. A doubtful record for Kenn Moor (Cundall). "In the moor [Kenn?] ditches in company with *Planorbis marginatus*, but not common" (Norman).

Planorbis umbilicatus Müller.—"Abundant in the rhines of all the moors, and common in ponds and ditches" (Norman); very common in rhines on Pennard Moor (E.W.S.); ditches at Harwood, near Wincanton (Herridge).

Planorbis corneus L.—A local species. Specimens from Yatton and Clevedon are in the Bristol Museum. "Very abundant in the moor districts" (Norman); "Beer Crowcombe, Taunton, three specimens" (Bowell); common in rhines on Pennard Moor, Glastonbury (E.W.S.).

Var. **albina** Moq.—Clevedon and Yatton (Bristol Mus.); Kenn Moor, Clevedon (Cundall).

Monstr. **distortum.**—Smaller than type; last whorl very large, passing over the penultimate whorl, and partly covering the apex. One specimen from a rhine on Pennard Moor, near Glastonbury (E.W.S.).

Planorbis contortus L.—Common in ditches and ponds. Kenn Moor, Ashton, Clevedon (Cundall); Pennard Moor, Wincanton, Bruton, etc. (E.W.S.).

Var. **albida** Jeffr.—Weston-super-Mare (Jeffr.); Yatton (Bristol Mus.).

Monstr. **distortum.**—"Specimens from a small pond near Walton Old Church are distorted, having the whorls irregularly coiled, and often folded over each other" (Norman).

Bullinus hypnorum L.—A very local species. "Dulcot, near Wells, Yatton; ditch near the Pill, Clevedon; and Weston-super-Mare" (Norman); Jenyns coll. (Bath Mus.); Worle, near Weston-super-Mare (Bristol Mus.); Long Ashton (Cundall); a small pool at Holbrooke, Wincanton (Herridge); Charlton Musgrove near Wincanton (E.W.S).; ditches at Harwood near the Cale (Galpin).

Var. **cuprella** Rowe.—With type. Near Bristol (Bristol Mus.); Charlton Musgrove (E.W.S).; Holbrooke, Wincanton (Herridge).

Physa fontinalis L.—Widely distributed. Jenyns coll. (Bath Mus.); Long Ashton (Bristol Mus.).

Var. **albina** Jeffr.—Long Ashton (Bristol Mus.).

Limnæa peregra Müll.—The most uberous of our freshwater mollusca; occurring everywhere.

Var. **acuminata** Jeffr.—"Among rejectamenta of the river at Uphill" (Norman).

Var. **labiosa** Jeffr.—With the type; of frequent occurrence in the fishponds at Holbrooke near Wincanton.

Var. **ovata** Drap.—Yatton (Bristol Mus.).

Var. **minor** Colb.—Yatton (Bristol Mus.); Glastonbury district.

Var. **lutea** Mont.—Near Shepton Montague.

Var. **succinæformis** Jeffr.—Rhines on Pennard Moor, Glastonbury.

Var. **lacustris** Leach.—From a rhine on Pennard Moor near Glastonbury.

Limnæa auricularia L.—Locally abundant. Bath Canal (C. W. Viner); Taunton (Crotch); in the Froom (Miller); Keynsham, Leigh Woods, and Clevedon (Cundall); Beer Crowcombe near Taunton (Bowell); fishponds above Holbrooke House, Wincanton (Herridge); river Cale below Wincanton (Galpin).

Var. **albida** Jeffr.—Bath (Clark).

Var. **acuta** Jeffr.—"Among rejectamenta of the river at Uphill" (Norman, as *Limnæus acutus*).

Var. **magna** Colb.—Fishponds above Holbrooke House, Wincanton; frequent.

Limnæa stagnalis L.—A widely-distributed species, especially abundant in the rhines and ditches of the moors.

Var. **labiata** Jeffr.—Clevedon (Cundall).

Var. **fragilis** L.—Kennet and Avon Canal (Cundall); Pennard Moor near Glastonbury.

Monstr. **sinistrorsum** Jeffr. — Kenn Moor, near Clevedon (Norman).

Limnæa palustris Müll.—Abundant in the rhines and ditches of the moors.

Var. **conica** Jeffr.—Yatton (McMurtrie).

Var. **roseolabiata** Jeffr.—Clevedon (Cundall); Yatton (Bristol Mus.).

Var. **minor** Taylor.—Pennard Moor, Glastonbury.

Var. **elongata** Moq.—Pennard Moor, Glastonbury.

Limnæa truncatula Müll.—Widely distributed and abundant.

Var. **elegans** Jeffr.—Frequent with the type throughout the Wincanton district.

***Limnæa glabra** Müll.—"Messrs. Forbes and Hanley write of this *Limnæus*: 'It occurs in several of our southern counties, espe-

cially in Wilts. and Somerset.' We have never succeeded in finding it, and it should probably be looked for on the eastern side of the county" (Norman).

Excepting two bleached shells in a ditch at Bratton St. Maur, which were probably carried there by birds, we have failed to find it in the extreme east of the county (E.W.S.).

Ancylus fluviatilis Müll.—A somewhat local species. Jenyns coll. (Bath Mus.); Portbury (Bristol Mus.); West-Mead Rhine, Yatton, and the river at Clevedon (Norman); Beer Crowcombe near Taunton (Bowell); river Cale, Wincanton (Herridge); the Stour at Gaspar, and the Shepton Montague stream near the bridge where it passes under the Bruton Road (E.W.S.).

Var. **albida** Jeffr.—Wookey, near Wells (Bristol Mus.); foot of Dulcot Hill, near Wells (Norman).

Velletia lacustris L.—Very local. Ham Green (Cundall); "local, the Avon, near Bath" (Norman); Bath (C. W. Viner); Hatch Park, Taunton (Bowell); Worle, near Weston-super-Mare (Bristol Mus.); river Froom (Miller); Bridgewater (Rev. W. R. Crotch).

Cyclostoma elegans Müll.—A local species. Jenyns coll. (Bath Mus.); Cundall records it as general, but Norman says it is "common among limestone rocks at Bath, Yatton, Wrington, Brockley, Cheddar, Axbridge, Wells, Weston-super-Mare, and Clevedon." Wadham's Down Wood, Bratton St. Maur (Herridge); Pitcombe and Bruton district (E.W.S.).

Var. **ochroleuca** Moq.—With type at Bruton and Bratton St. Maur (E.W.S.).

Var. **fasciata** Picard.—Bath (Mrs. Oldroyd).

Acicula lineata Drap.—Extremely local and rare. Rejectamenta of the Avon below Bristol (Norman); rejectamenta of the Brue below Castle Cary, and the valley stream at Bratton St. Maur (E.W.S.).

Var. **alba** Jeffr.—Rejectamenta of river Avon, Bristol (Jeffreys); rejectamenta of stream at Bratton St. Maur (E.W.S.).

Monstr. **sinistrorsum** Jeffr. — Rejectamenta of river Avon, Bristol (Jeffr.).

Neritina fluviatilis L.—Local. Avon at Bath (Viner); Jenyns coll. (Bath Mus.); Bath Canal (Bristol Mus.); in pools near the Avon (Miller); Bridgewater and Weston-super-Mare (Crotch); river Brue at Glastonbury (E.W.S.); river Cale at Wincanton (Galpin); canal at Beer Crowcombe, Taunton (Bowell).

Var. **cerina** Colb.—Bath Canal, labelled "this rare variety of *N. fluviatilis* was discovered by Miss F. M. Hele, of Bristol, in 1882." (Bristol Mus.).

*Viviparus viviparus L.—Very local. We have seen examples from Dunster, near the castle; otherwise it has only been recorded for the neighbourhood of Bath; Avon Canal (Bath Mus. and Bristol Mus.).

Var. **efasciata** Pickering.—Bath Canal (Bristol Mus.).

Bythinia tentaculata L.—Common in ditches and the rhines on the moors; Jenyns coll. (Bath Mus.); Weston-super-Mare and Yatton (Bristol Mus.).

Var. **ventricosa** Menke.—Bristol (Jeffr.).

Var. **rufescens** Ckll. — Rejectamenta of Brue below Castle Cary; and from ditches bordering on the river Cale at Harwood below Wincanton (E.W.S.).

Bythinia leachii Shepp. — Local. In the larger and clearer streams; abundant and fine in West Mead Rhine, Yatton (Norman); Kenn Moor and river Avon (Cundall); Weston-super-Mare (Crotch); near Clevedon (Bristol Mus.); Pennard Moor, Glastonbury (E.W.S.).

Valvata piscinalis Müll.—Common. Jenyns coll. (Bath Mus.); Yatton (Bristol Mus.).

Var. **acuminata** Jeffr.—River Avon, Bristol (Jeffr.).

Valvata cristata Müll.—Well distributed in North Somerset; Worle near Weston-super-Mare (Bristol Mus.); "very local, a few specimens from a ditch in Kenn Moor, also near Wells" (Norman); rejectamenta of the Brue below Castle Cary; common in rhines on the moors around Glastonbury, and of frequent occurrence in ponds and ditches in the Wincanton district (E.W.S.).

Unio tumidus Phil.—Apparently confined to the river Avon; Bath Canal, Jenyns coll. (Bath Mus.); Wilson coll. (Bristol Mus).; Avon and Kennet Canal (Forbes and Hanley, Cundall).

Var. **radiata** Colb.—Avon and Kennet Canal (Cundall).

Var. **ovalis** Mont.—River Avon, Bath (Cundall).

Unio pictorum L.—Common in the rivers Avon and Brue.

Var. **radiata** Moq.—River Avon, Bristol (Cundall).

Var. **compressa** Jeffr.—Bath Canal (Mrs. Oldroyd).

*Anodonta cygnea L.—Frequent in the rivers and the majority of the largest ponds throughout the county; very fine examples from the Bath Canal are in the Jenyns coll. (Bath Mus.); Kennet and Avon Canal and Kenn Moor (Cundall); Nailsea Moor and Yatton (Bristol Mus.).

Anodonta anatina L.—Generally distributed. Avon, Jenyns Coll. (Bath Mus.); Wilson Coll. (Bristol Mus.); common in the rivers Brue and Cale (E.W.S.).

Var. **radiata** Müll.—Bath Canal (Bristol Mus.).

Var. **ventricosa** C. Pfr.—Keynsham (Bristol Mus.)

Sphærium corneum L.—Very common.

Var. **flavescens** Macgill.—Clevedon (Cundall).

Var. **nucleus** Studer.—Clevedon (Cundall).

Var. **scaldiana** Norman.—Bath (Rich).

Var. **pisidioides** Gray.—River Avon, Bath (Jordan).

Sphærium lacustre Müll.—Local, frequenting ponds. Bath (Bristol Mus.); Jenyns coll. (as *S. calyculatum*) (Bath Mus.); Avonmouth and Ham Green (Cundall); Clevedon Hill (Norman); ponds at Bratton St. Maur, Wincanton (E.W.S.).

Sphærium rivicola Leach.—Local. Bath Canal (Bath Mus., Bristol Mus.); Keynsham, Kennet, and Avon Canal (Cundall); river Cale at Harwood below Wincanton (Galpin).

***Sphærium pallidum** Gray.—Jenyns coll. (Bath Mus).; Kennet and Avon Canal (Cundall). Apparently confined to the river Avon, for I find no other records.

Pisidium amnicum Müll.—Widely distributed in ponds and ditches.

Pisidium fontinale Drap.—Widely distributed. "Common on the moor between Clevedon and Portishead" (Norman); frequent in the Wincanton district.

Var. **henslowana** Shepp.—Leigh Woods, and Kennet and Avon Canal (Cundall); Clevedon (Norman).

Var. **pulchella** Jenyns.—Jenyns coll., labelled as a species (Bath Mus.); "in the larger and clearer of the rhines not uncommon; fine in West Mead Rhine, Yatton" (Norman).

Var. **cinerea** Alder.—Kenn Moor (Norman); Kennet and Avon Canal (Cundall); Bath (Clark).

Pisidium pusillum Gm.—A rare species. Jenyns coll. (Bath Mus.); Avonmouth and Bedminster (Cundall).

Var. **obtusalis** Lam.—Avonmouth (Cundall); in a ditch near the Pill, Clevedon (Norman).

Pisidium nitidum Jenyns.—A very rare species. The only record is "a large pond by the side of the railway at the third (?) bridge from Clevedon" (Norman). The same locality from which Norman recorded another rare species, *Planorbis parvus* Say (E.W.S.).

Dreissensia polymorpha Pall.—An extremely local species. Jenyns coll. (Bath Mus.); Bath Canal (Mrs. Oldroyd); river Avon and Avon and Kennet Canal near Bristol (Cundall). It being an alien species, we here give *in toto* Norman's note upon it:—

"The late Mr. Hugh Strickland, in a paper published in Loudon's Magazine of Natural History, new series (vol. ii.), 1838, p. 361, on the 'Naturalisation of *Dreissena* in England,' states that this shell has

lately been 'planted' by Mr. Stutchbury, of Bristol, in some waters near that place. So prolific a species once planted is hardly likely to have become extinct."

Norman made this observation in the year 1860; since then his supposition has been amply verified, for the species has spread from Bristol to Bath, where it is now very abundant.

ESTUARINE OR MARINE PULMONOBRANCHS.

Assiminea grayana Leach.—Avonmouth (Cundall).

Melampus bidentatus Mont.—"Banks of the Avon near Pill" (Cundall).

M. bidentatus Mont. var. **alba** Turt.—"Banks of the Avon near Pill" (Cundall).

M. myosotis Drap.—"Banks of the Avon near Pill" (Cundall).

M. myosotis Drap. var. **ringens** Turt.—"Banks of the Avon near Pill" (Cundall).

Hydrobia ventrosa Mont.—"Avonmouth, Shirehampton, and Cook's Folly" (Cundall); "in marvellous abundance in a ditch near the Pill, Clevedon" (Norman).

H. ulvæ Penn.—"River mouths on the Somerset coast" (Norman).

SPECIES ERRONEOUSLY RECORDED FOR SOMERSETSHIRE.

Helix pomatia L.—Stapleton (Norman). Stapleton is in Gloucestershire.

Bulimus goodalli Miller (= **Stenogyra goodalli** Müll.).—"This species described by Miller from specimens taken in pine beds at the Clifton Nurseries, has continued to abound in that locality up to the present time" (Norman). Clifton is in Gloucestershire.

Testacella scutulum Sowb.—Recorded for Taunton by error, instead of *Testacella maugei* Fér.[1]

Anodonta cygnea var. **incrassata** Shepp.—(As *Mytilus avonensis*). Bath and Bristol Avon, by error for the Salisbury and Hants. Avon (Montagu, *Test. Brit.*, p. 172).

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'84. PONSONBY, JOHN, F.Z.S.—A List of Shells found in the Neighbourhood of Yeovil, *J. Conch.*, vol. 4, p. 245, 1884.[1]

'90. SWANTON, E. W.—A Day's Conchology on the Glastonbury Moors, *Naturalists' Gazette*, vol. 2, 1890.

'91. ———. A List of the Shells of the Wincanton District, *Proc. Wincanton Field Club*, third annual report, 1891.

'94. ———. *Vertigo edentula* in Somerset, *Naturalists' Journal*, vol. 2, 1894.

'95. ———. Fauna and Flora of a Somerset Village, *op. cit.*, vol. 4, 1895.

BOWELL, E. W. W.—Notes on the Mollusca of Hatch, co. Somerset. (*In manuscript.*)

Note on Petricola pholadiformis Lam.—This shell was first noted as British in 1890 (*Proc. Mal. Soc.*, vol. 1, p. 291; vol. 2, p. 134, 135), and in 1896 was found at Herne Bay and Shellness near Sandwich. It now flourishes on Sandwich Flats, though the shells there never seem to attain anything like the size of Herne Bay examples; this may be due to the more sheltered waters of the last-named locality. The shell is usually pure white in colour, but about two per cent. have the posterior side stained with reddish-purple; this staining appears to be done by the mollusc itself and is not due to any external cause. About one-third of the Shellness examples are more or less deformed at the posterior side, which is either shortened and rounded or else twisted to one side. It would be interesting to know the reason of this torsion, which seldom or never occurs in *Pholas candida*, a shell similar in size and habitat.—J. E. COOPER. (*Read before the Society*, June 14, 1899).

1 Enumerates fifty-three species, including the rare *Helix granulata* (=*sericea*). I much regret the omission of Mr. Ponsonby's records, but only became aware of his paper after the completion of my notes and the publication of some of them in the April number of the *Journal*.

SYNOPSIS OF THE AMERICAN SPECIES OF THE FAMILY DIPLODONTIDÆ.

By W. H. DALL.

(Read before the Society, April 12th, 1899).

The family Diplodontidæ comprises the genera *Felania*, *Diplodonta*, *Ungulina*, and *Joannisiella*.

The Cryptodontidæ, which have been by some authors united with this group, possess very remarkable anatomical characters and should be kept separate. *Joannisiella* has long been confounded with *Cyrenoidea*, from which much misconception has arisen. The former is a brackish water *Diplodonta* with a flattened foot, the latter belongs to a distinct group. The typical *Felania* is close to *Diplodonta*, but many Lucinoid shells have been mistakenly referred to *Felania*.

Genus *DIPLODONTA*, Bronn, 1831.

EAST AMERICAN SPECIES.

Section Diplodonta, s.s.

Type *Venus lupinus* Brocchi; not *Diplodon* Spix, 1827; *Mysia* Brown, Conrad *et al.*, not of Leach; *Glocomene* Leach, 1852; *Cycladicama* Val., 1854; *Mittrea* Gray, 1857; *Egeria* sp. Lea, *Cyrenella* sp. Sby.

1. **D. punctata** (Say as *Amphidesma*, 1882). *D. venezuelensis* Dkr., 1848; + *D. janeirensis* Rve., 1850; + *D. subglobosa* C. B. Ads., 1852; + *D. braziliensis* Mittré, 1850; + *D. orbella* Gabb, non Gould, 1881; + *Mysia pellucida* Heilprin, 1889.

Range. Cape Hatteras to Southern Brazil. Also Pleistocene.

2. **D. nucleiformis** Wagner, 1838; + *D. elevata* Conr., 1845; + *D. carolinensis* Conr., 1875.

Range. Coast of the Carolinas, 15-52 fathoms, living; also fossil in the Miocene of Virginia and N. Carolina.

Section Felaniella Dall, 1899.

Type *Felania usta* Gld. Shell like *Diplodonta* but heavy, compressed, externally smooth, with a conspicuous dark periostracum and less equilateral valves.

3. **D. candeana** d'Orbigny, 1846.

Range. Marco, Florida, to Brazil.

4. **D. vilardiboana** d'Orbigny, 1846.

Range. Brazilian and Argentine coasts.

Section Phlyctiderma Dall, 1899.

Type *D. semiaspera* Philippi. Shell like *Diplodonta*, but with the surface more or less punctate or pustulate.

5. **D. soror** C. B. Adams, 1852.

Range. Jamaica, West Indies; north to Texas and the Florida Keys; fossil in the Miocene of Virginia and North Carolina.

6. **D. semiaspera** Philippi, 1836; + *D. granulosa* C. B. Adams, 1852; + *D. semireticulata* d'Orb., 1846; not *D. semiaspera* Dkr. of Japan.

Range. Cape Hatteras, North Carolina to Rio Janeiro, Brazil, in moderate depths of water. Also Pliocene of Florida.

7. **D. puncturella** Dall.

Range. Jamaica, West Indies. Also in the Oligocene of Bowden, Jamaica.

8. **D. platensis** Dall, n.sp.

Range. In 11 fathoms off Rio de la Plata, Argentina, U.S. Fish Commission.

Section SPHÆRELLA Conrad, 1838.

Type *S. subvexa* Conrad.

Range. Miocene of Virginia.

9. **D. verrilli** Dall. = *D. turgida* V. and S., 1881, not Conrad, 1848.

Range. Martha's Vineyard, Mass., to North Carolina, in 15-69 fathoms, U.S. Fish Commission; Grenada? W.I., "Blake" Expedition.

WEST AMERICAN SPECIES.

Section DIPLODONTA s.s.

1. **D. orbella** Gould, 1852; + *Sphærella tumida* (Conr. MS.), Cpr., 1863.

Range. British Columbia, south to Lower California.

2. **D. tellinoides** Reeve, 1850.

Range. Panama to Guayaquil.

3. **D. discrepans** Cpr., 1857 (?)

Range. Mazatlan.

4. **D. subquadrata** Cpr., 1855, not *D. subquadrata* Gabb, 1873, but perhaps *D. undata* Cpr., 1857.

Range. Cape St. Lucas to Acapulco and Mazatlan.

In his description (P.Z.S., 1855, p. 230), Carpenter has mistaken the edge of the oblique and excavated hinge plate for a lateral tooth. He has omitted it from the Mazatlan catalogue.

Section FELANIELLA Dall.

5. **D. obliqua** Philippi, 1846; + *Lucina calculus* Reeve, 1850.

Range. Cape St. Lucas, Xantus; Mazatlan, Philippi.

6. **D. cornea** Reeve, 1850.

Range. Gulf of Nicoya.

7. **D. sericata** Reeve, 1850; + *Felania sericata* Cpr., 1863.
Range. Gulf of California.

8. **D. nitens** Reeve, 1850.
Range. Bay of Guayaquil.

Section PHLYCTIDERMA Dall.

9. **D. cælata** Reeve, 1850.
Range. Bay of Guayaquil.

10. **D. semirugosa** Dall, nom. nov. = *D. semiaspera* Cpr., Mazatlan Catalogue, p. 102, 1857, not of Philippi, 1836.

Range. Gulf of California.

This species is more globose than the West Indian form, and the external sculpture, when perfect, is of a different character. Worn specimens were confounded with Philippi's species by Carpenter.

NOTES.

Lucina leucophæata Reeve, 1850, of which the locality is unknown, may, perhaps, belong to the West American fauna, and is certainly a *Diplodonta*.

L. guaraniana and **L. porteziana** d'Orbigny, 1846, from Rio Janeiro, and **L. patagonica** d'Orbigny, 1842, from San Blas, on the Argentine coast, appear to belong to the typical section of *Diplodonta*, but I have not been able to examine specimens.

Diplodonta puncturella Dall, n.sp., is a small species resembling *D. capuloides* Gabb, but less turgid, and having the entire surface closely, regularly, microscopically punctate. Alt., 6·7; lat. 6·5; diam. 4·0 mm. It is also found in the Oligocene Bowden Beds of Jamaica, and will be fully described and figured elsewhere.

D. platensis Dall, n.sp.

Shell small, solid, turgid, subequilateral, with prominent beaks, wider than high, the anterior end more pointed and longer than the other; surface sculptured with fine concentric wrinkles most elevated anteriorly and on the disc more or less alternately broken up, forming an irregular chequered pattern; hinge plate narrow, teeth and ligament normal, adductor scars very large and extending nearly to the base; pallial line and margin simple; colour yellowish white. Alt., 11·5; lat., 13·0; diam., 10·0 mm.

The posterior adductor scar, though extending far down, is not, as in *Sphærella*, separated by a gap from the cardinal region.

DESCRIPTIONS OF NEW SPECIES OF SOUTH AFRICAN MARINE SHELLS.

By EDGAR A. SMITH.

(Read before the Society, June 14, 1899).

(Plate V.).

Several papers on the molluscan fauna of South Africa, by Mr. G. B. Sowerby, which appeared in this Journal,[1] were subsequently embodied in his separate publication, entitled "Marine Shells of South Africa." The present short paper may be regarded as a supplement to that work, and it is proposed to issue from time to time further appendices referring to some omissions and errors which have been noticed. Mr. Sowerby having through pressure of business decided to abandon further work upon this subject, Mr. J. H. Ponsonby very kindly placed the material received from his correspondents at my disposal, and has also presented to the British Museum a very valuable collection of South African shells got together during recent years. To Mr. H. Burnup and Mr. F. Quekett we are especially indebted for so energetically forwarding the results of their collecting.

1. **Terebra (Abretia) lightfooti.** (Pl. V., fig. 1).

Testa breviter subulata, pallide fuscescens, prope medium anfr. ultimi zona alba cincta; anfractus circiter 10, superiores tres læves, subpellucidi, convexi, cæteri convexiusculi, costis arcuatis, leviter obliquis (in anfr. superioribus 10, *in ultimo* 14-15) *instructi, striis incrementi tenuissimis sculpti, haud spiraliter striati; apertura parva, longit. totius* $\frac{1}{4}$ *paulo superans; columella vix recta; canalis latus, brevissimus, obliquus, recurvus. Longit.* $19\frac{1}{2}$ *mm., diam.* 6. *Apertura* 6 *longa,* $2\frac{1}{2}$ *lata.*

Hab., Table Bay, 10 fath. (Lightfoot).

There is a very faint indication of a second pallid zone around the upper part of the body-whorl and the middle of the upper volutions. It is very closely allied to *T. tristis* Desh., but is rather stouter, has stronger costæ and flatter whorls, the last being somewhat quadrate. The coloration also is different.

2. **Columbella (Nitidella) apicata.** (Pl. V., fig. 2).

Testa ovato-fusiformis, flavescens, lineis undulatis longitudinalibus fusconigris ad medium anfractus ultimi interruptis picta, infra suturam albo et nigro tessellata; spira conica, ad apicem obtusa; anfractus sex, primus globosus, magnus, pallidus, sequentes vix convexiusculi, fere plani, fere turriti, læves, ultimus circa basim oblique striatus;

1 Vol. 5, pp. 1-13; vol. 6, pp. 6-15, pl. 1, pp. 147-159, pl. 3; vol. 7, pp. 368-378.

apertura parva, angusta, longit. totius $\frac{2}{5}$ *æquans; labrum mediocriter incrassatum intus tuberculis paucis obsoletis instructum; columella callo tenui induta, lævis. Longit.* 9·5, *diam.* 4 *mm.*

Hab., Durban (Burnup).

Remarkable on account of the very large globular protoconch which is slightly out of the perpendicular.

3. **Cominella (?) prolongata.** (Pl. V., fig. 3).

Testa fusiformis, albida, epidermide lutescente scabrosa plus minus induta, spiraliter costata et striata; spira elongata, acuminata; anfractus circiter 8-9, *supra leviter concavi, infra convexi, sutura obliqua sejuncti, superiores longitudinaliter subplicati, plicis in ultimo obsoletis, ultimus antice oblique descendens, breviter rostratus et canaliculatus; apertura superne ovalis, antice in canalem obliquum producta, alba; labrum tenue, intus tenuiter liratum; columella in medio arcuata, callo tenui, prope labrum tuberculum formante, induta. Longit.* 61, *diam.* 27. *Apertura cum canali* 32 *longa,* 11 *mm. lata.*

Hab., Cape Colony.

A remarkably elongate fusiform species, with deep spiral striæ, marking off broad intervening costæ which are also spirally striated. The periostracum is thickish, fibrous, and exhibits close distinct lines of growth. The animal and operculum being unknown, it is uncertain whether this species is correctly located in the genus *Cominella*.

4. **Lotorium durbanense.** (Pl. V., fig. 4).

Testa ovato-fusiformis, cæruleo-grisea, zona mediana pallida cincta, lirisque pallidis rufo punctatis ornata, epidermide fibrosa fugaci flavescenti-olivacea induta; anfractus 8-9, *superiores quinque læves, convexi, supra medium nigrescentes, infra flavescentes, penultimus convexus, sutura canaliculata ultimo sejunctus, liris duabus granosis spiralibus duplicibus biangulatus, costis longitudinalibus tenuibus circa* 13 *subcancellatus, ultimus varice unico sinistrorsum instructus, antice breviter recurvi-rostratus, liris transversis* 6-7 *duplicibus granosis cinctus, in interstitiis lineis incrementi et transversis granose subcancellatus; apertura acute ovata, intus nigrescens, in medio pallide zonata; labrum valde incrassatum, intus album, septemdentatum; columella in medio arcuata, callo albo tenui, tuberculis paucis infra munito, induta; canalis anterior angustus, leviter obliquus, recurvus, intus nigrescens. Longit.* 26, *diam.* 16 *mm.*

Hab., Durban (Burnup).

A pretty little species, characterized by the double, transverse granose wavy liræ, which are separated by a reddish thread-like line,

and more or less spotted and dotted with the same colour. The outer lip and the varix on the left also are marked with three equidistant red spots corresponding to three obscure transverse bands.

5. **Marginella punctilineata.** (Pl. V., fig. 5).

Testa parva, pallida vel dilute rosea, lineis gracilibus longitudinalibus fusco punctatis ornata, lævis; spira brevis, conoidea, ad apicem album obtusa; anfractus $4\frac{1}{2}$ *celeriter crescentes, ultimus superne declivis, et obtuse vel obsolete angulatus, infra leviter convexiusculus, ad labrum paulo ascendens; apertura augusta, intus fuscescens; labrum valde incrassatum, album, extra roseo tinctum, intus vix denticulatum, superne leviter sinuatum; columella quadriplicata, duobus inferioribus quam superioribus paulo majoribus. Longit.* $9\frac{1}{2}$ *mm., diam.* $5\frac{1}{2}$. *Apertura cum labro* 8 *longa, intus* $1\frac{1}{2}$ *lata.*

Hab., Umkomaas, Natal (Burnup).

The fine lines under a lens are seen to be minutely punctate, and they are crossed by two faint pale zones, one at the shoulder of the body-whorl, the other somewhat below the middle.

6. **Fenella natalensis.** (Pl. V., fig. 6).

Testa pupoidea, ad apicem acuta, albida, zonis duabus pallide flavis indistinctis cincta, interdum omnino rufescens, costis longitudinalibus lirisque spiralibus plus minus fortiter cancellata; anfractus 8, *superiores* 1-2 *læves, rotundati, tres sequentes in medio angulati, cæteri convexiusculi; apertura ovata, superne acuta; peristoma simplex, acutum, margine columellari incrassato, ad basim reflexo, superne callo labro iuncto. Longit* 5 *mm., diam.* $1\frac{3}{4}$.

Hab. Cato's Creek, near Durban (Burnup).

The form is rather variable, some examples being narrower and more cylindrical than others. The strength of the cancellation also varies, the longitudinal costæ on the penultimate whorl numbering from sixteen to twenty-two, and the spiral ridges from four to five. The latter on the body-whorl are about ten in number, those around the base being only feebly crossed by the longitudinals.

This species is probably the *F. fulgida* C. B. Adams from Natal, of Nevill's Hand List, Moll. Ind. Mus., part 2, p. 116, *F. fulgida*, I believe to be a manuscript name imposed upon this species by A. Adams, specimens so named having been obtained by the Museum from the collection of H. Adams.

7. **Eulima munda.** (Pl. V., fig. 7).

Testa parva, polita, albido-subpellucida, fere recta, subulata, gracilis, acuta; anfractus 12 *fere plani, regulariter lente accrescentes, supra pellucide marginati, ultimus mediocriter elongatus; apertura inverse piriformis, longit. totius* $\frac{1}{4}$ *æquans; peristoma simplex, marginibus callo tenui junctis. Longit.* 6, *diam.* 1·5 *mm. Apertura* 1·5 *longa.*

Hab., Umkomaas, Natal.

In this species the aperture is broadly rounded anteriorly and pointed behind, and the spire is straight or exhibits only a very feeble dextral curve.

8. **Eulima natalensis.** (Pl. V., fig. 8).

Testa late subulata, subrecta, nitida, alba; anfractus 11 regulariter accrescentes, superiores 5-6 *leviter convexiusculi, cæteri fere plani, linea pellucida marginati, ultimus in medio obsolete subangulatus, infra leviter curvatus; apertura ovato-piriformis, longit. totius* ¼ *æquans; peristoma marginibus callo crassiusculo junctis. Longit.* 7, *diam.* 2·75 *mm. Apertura* 1·75 *longa.*

Hab., Durban.

Very feebly or scarcely at all curved, with the body-whorl indistinctly angled and somewhat broad at the middle. It is not quite so straight as *E. solida* Sow., and the labrum is not thickened in the same manner.

9. **Eulima dilecta.** (Pl. V., fig. 9).

Testa parva, alba, nitida, subclaviformis, leviter curvata; anfractus novem, lente accrescentes, primus mediocriter magnus, obtuse rotundatus, cæteri leviter convexiusculi, infra suturam pellucide marginati, ultimus ad medium rotundatus; apertura parva, piriformis, longit. totius ¼ *paulo superans; peristoma curvatum, subpatulum, marginibus callo distincto junctis, columellari ad basim valde incrassato. Longit.* 4⅓, *diam.* 1½ *mm. Apertura* 1¼ *longa.*

Hab., Unkomaas, Natal

A pretty little species, with a slightly curved spire and more convex whorls than the other species now described.

10. **Odostomia chitonicola.** (Pl. V., fig. 10).

Testa minuta, ovato-cylindracea, imperforata, tenuis, pellucido-cornea, lævis, lineis incrementi tenuissimis obliquis curvatis striata; spira haud acuminata, ad apicem globosa; anfractus 5, *primus globosus, introversus, cæteri convexiusculi, infra suturam obliquam linea pellucida marginati; apertura elongato-piriformis; peristoma tenue, simplex, margine columellari arcuato, supra leviter unidentato vel plicato, subincrassato. Longit* 2 *mm., diam.* ¾. *Apertura* ⅔ *longa,* ½ *lata.*

Hab., Unkomaas, Natal, on *Chiton fossus* (Burnup).

As small as the British *O. nivosa* of Montagu, but differing in form, the whorls being less convex, and the last longer. The aperture consequently is more elongated.

11. **Calliostoma burnupi.** (Pl. V., fig. 11).

Testa parva, conica, imperforata, pallide rufescens vel rosacea supra fusco-maculata, ad peripheriam, lira pallida fusco notata cincta, infra

liris concentricis subgranosis circiter decem dilute fusco-punctatis ornata, ad apicem nigrescens; anfractus octo, plani, sutura profunda sejuncti, liris granosis (in anfr. penult. sex) instructi, ultimus in medio rotunde angulatus, infra planiusculus; apertura oblique subquadrata; columella incrassata, callosa, alba. Diam. maj. 9 *mm., min.* 8 *; alt.* 10.

Hab., Durban (Burnup).

A solid little species, prettily granulated, the granules upon the base being less pronounced than those above, and the thread-like interstices brown. The general tone is a fleshy tint, varied at intervals with brown blotches which are often pale bordered on the left or anterior side. The lowermost row of granules being smaller than those above gives the whorls a channeled appearance at the suture.

12. **Loripes rosacea.** (Pl. V., figs. 12, 13).

Testa subcircularis, valde inæquivalvis, pallide rosacea, lineis incrementi concentricis conspicue striata; valva sinistra mediocriter profunda, dextra plana; umbones acuti, antrorsum curvati; pagina interna rosacea; cicatrix anterior elongata, linguæformis, posterior brevior, latior; dentes cardinis valvæ dextræ duo, postico majore, dens lateralis anterior conicus, valvæ sinistræ dens cardinalis unicus; ligamentum internum elongatum, rectum. Longit. 17, *alt.* 18, *diam.* 6 *mm.*

Hab., Durban.

This interesting species may at once be recognized by the pale rose colour and the unequal valves, of which the right is quite flat.

13. **Montacuta natalensis.** (Pl. V., fig. 14).

Testa minima, oblonga, valde inæquilateralis, postice leviter angustata, alba, epidermide tenui lutescenti induta, lineis incrementi striata; latus anticum rotundatum, prope umbones subconcavum, posticum angustius; margo dorsi posticus leviter curvatus, declivis, ventralis paulo arcuatus; umbones curvati, prominentes, longe ante medium siti; dentes duo valvæ sinistræ divergentes, prominentes, postico anteriori longiore; resilium validum; cicatrices conspicuæ. Longit. $2\frac{1}{2}$ *mm., alt.* $1\frac{2}{3}$., *diam.* $1\frac{1}{2}$.

Hab., Unkomaas, Natal (Burnup).

Differing from *M. bidentata* Montagu in form and in the more anterior position of the umbones, which are more prominent and larger.

14. **Plicatula squamosissima.** (Pl. V., figs. 15, 16).

Testa oblonga, subovata, irregularis, umbones versus angustata, compressa, sordida albida, saturate rufo punctulata, radiatim confertim costata, costis rugosis dense squamulatis, intus olivaceo-fusca, rufo

obscure notata; valva dextra planiuscula, sinistra convexior. Longit. umbone ad marg. ventralem 23, *latit.* 17, *diam.* 8 *mm.*

Hab., Unkomaas (Burnup).

This species is distinguished by the closeness of the ribs and the crowded irregular scales upon them; also for the olivaceous tint of the interior of the valves. The number of the costæ is variable, and the interstices between them are very much narrower than the ribs themselves and often more or less filled with series of minute scales.

Belgium and the Ardennes.—During a fortnight's visit to the above last May and June I took the opportunity of making enquiries as to the records of distribution of Land and Freshwater Mollusca. The Museum at Brussels is admirably arranged. I could not hear of any species peculiar to Belgium. The following localities I noted and they may prove helpful as a guide. For terrestrial species Dinant, Marche, Couvin, Namur, Hastière, near Dinant, Roumont, Wepion, near Namur, Anseremme, Arlon, Luxemburg, Kinkimpois. For aquatic species Gembloux, Houffalise, La Roche, Vielsalin, near Diekirch. These localities include the Grand Duchy of Luxemburg. Books upon the subject I tried in vain to find at the shops as far as my brief visit allowed. Monsieur Dupont was mentioned as the author of a work on the Conchology of Belgium, and perhaps the book may be known to some member of the Society. My stay in the rural districts was very limited owing to the weather and other causes. But I brought back a live *Helix pomatia* from Rochefort, and gathered some specimens on the Citadel of Dinant behind the Hotel Tête d'Or after the three days' rain at Whitsuntide. *Cyclostoma elegans* was larger than I had yet seen it, and a few *Helices* and a *Hyalinia* were the only spoils I took. The limestone districts ought to be very happy hunting grounds if the season be favourable. The *Helix pomatia* or Escargot as they call it in Belgium, has made itself at home with me and it is only the fear of the ravages which they are said to make among the vegetables in their native land, which makes me hesitate to send for more. They are to be had for seven pence a dozen and their export is encouraged rather than otherwise, in spite of their excellent nutritious properties.—CARLETON GREENE (*Read before the Society*, April 12th, 1899).

The occurrence of Limnæa peregra var. **burnetti in Windermere.**—I took a specimen which I believe to be of the above variety of this very variable mollusc in August, 1896, in Windermere, near Water Head, in company with the var. *lacustris* already well known from this lake. At first I fancied it was only an example of var. *lacustris*, in which the apical whorls had been destroyed by erosion, but, on closer examination, it was evidently something else; and I can myself see no difference between it and well-authenticated specimens of the var. *burnetti* from Loch Skene. The vars. *lacustris* and *burnetti* of *L. peregra* and *L. involuta* (which is most probably only a variety of *L. peregra*) all owe their distinguishing characteristics to a graduated intorsion of the spire, which is most marked in the last-named, less so in the second, and least of all in the first. *L. involuta* and *L. peregra* var. *burnetti* have had exceptional opportunities for developing and perpetuating remarkable variations from their extreme isolation. There is, however, no reason why the same variations should not occasionally occur in localities which do not present the circumstances necessary to their permanency. It is to the latter class that I would relegate my specimen of *L. peregra* v. *burnetti* from Windermere.—K. HURLSTONE JONES, M.B., R.N., H.M.S. 'Repulse,' Jan. 9th, 1898 (*Read before the Society*, Jan. 11th, 1899).

THE CORROSION OF SHELLS IN CABINETS.

SUPPLEMENT.

By L. St. G. BYNE, M.Sc.

(Read before the Society, June 14, 1899.)

At the time of writing my former paper[1] I did not possess any knowledge of bacteriology, but I had come to the conclusion some months before that the corrosion was due originally to the action of bacteria. I am now enabled through the kindness of Dr. Ewart to adduce a considerable amount of evidence in support of this. I still adhere to the five items of my previous summary.

The white powdery substance upon the surface of the shells was found to consist of calcium butyrate, in some instances mixed with calcium acetate. It was formed by the action of butyric and acetic acids upon the calcium carbonate of the shell structure.

Since butyric acid does not occur in the atmosphere, it can hardly have had an external origin. It must, therefore, have been derived from fermentative processes occurring in the organic material of the shell, or of adhering portions of the molluscan inhabitant. Both aërobic and anaërobic bacteria are known which can cause various carbohydrates to ferment, producing butyric and acetic acids. It is very often the case that a portion of the liver is left attached to the shell, especially to the apex. This might easily undergo butyric fermentation, and, moreover, the same might occur with the adhesive substance used to fix the specimen to its card. Both aërobic and anaërobic butyric bacteria exist, but the common forms are anaërobic. Hence we should expect to find the danger of spoiling increased with imperfect aëration in closed or hermetically-sealed cases, in which at the same time there would be no possibility of the acid products escaping. A little moisture is required to start the fermentation; hence, dry cases should escape, and even in damp air the process can only take place with great slowness, for as soon as the products accumulate to a certain extent fermentation ceases until they have been removed.

There are also certain forms which can cause proteids to ferment with the production of butyric and acetic acids together with bad-smelling gases. In this case, however, the latter would hardly be perceptible.

That the mischief is of bacterial origin is supported by the following facts :—

1.—*Butyric acid has been found.*

This could only be produced by the butyric fermentation of carbohydrates, or even proteid substances. Acetic acid is amongst the fermentative products of butyric bacteria, and

1 *Vide antea*, p. 172-178.

calcium acetate has been found in some of the shells.

2.—*The shells in the top cases that are exposed to light are practically unaffected.*

This points strongly to bacteria. The deadly action of direct sunlight on bacteria is well known, and may produce death in from five minutes to an hour when they are in the vegetative condition. Even strong diffuse daylight suffices to retard or even inhibit the development of many bacteria.

3.—*The shells in the drawers kept in the dark are the worst attacked.*

This necessarily follows from the above statement. Darkness is favourable to the development of these fermentative organisms. Within the shell the bacteria would even in the top cases be protected from the inimical effect of light.

I stated in my former paper that the corrosion had not occurred in private collections. Since its publication I have been informed that some shells in a large private collection at Birmingham have been badly corroded, and have caused anxiety for some time past. Also, I have examined several specimens of the genus *Cypræa* from the Gratrix Collection in Manchester. These all possessed a marked vinegar-like odour. Upon being submitted to the same chemical tests as the shells from the British Museum, they were found to contain both calcium butyrate and acetate, and thus show that they had been exposed to the same conditions as those at South Kensington.

Prevention.

It must surely be conceded that an infallible remedy cannot be given. My critics have either overlooked or paid no attention to the fact that the corrosion does not appear until after the lapse of about ten years.

The suggestions received are :—

1.—Boiling in oil.

2.—Rubbing over the surface with such substances as oil of turpentine, oil of cloves, and formalin.

I am of opinion that these may be dismissed as ineffectual. Now that we know that the corrosion is caused by bacteria, I am more than ever convinced that soaking in corrosive sublimate solution, combined with previous thorough cleaning, will prove effectual. It must be remembered that corrosive sublimate is an *extremely poisonous* substance. The drawers should be thoroughly aërated at intervals, to remove accumulated acid vapours, which will never be present in more than minute traces. The drawers should also be kept well dried.

8, Sea View Terrace,
Seaton, Devon.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

281st Meeting, June 14th, 1899.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted :

The Irish Naturalist, vol. 8, no. 6 ; the Naturalist, no. 509 ; Science Gossip, vol. 5, no. 61 ; La Feuille des Jeunes Naturalistes, ser. 3, no. 344 ; the Nautilus, vol. 13, no. 1 ; Proceedings of the Royal Physical Society, Edinburgh, 1897-98 ; Société Royale Malacologique, Brussels, Annales, 1890-95, Bulletin, Tome 34, nos. 1, 2, Mémoires, Tome 34, no. 1 ; Australian Museum Records, vol. 3, no. 5 ; Proceedings and Transactions of the Nova Scotian Institute of Science, vol. 9, part 4.

New Member Elected.

Mr. Frederick Darnbrough, Croft Villa, Eaglescliffe, Yarm-on-Tees.

Candidates Proposed for Membership.

Mr. J. C. Mansel-Pleydell ; Mr. J. W. Vaughan ; Mr. W. Neville Sturt.

Papers Read.

"Description of new species of South African Marine Shells," by E. A. Smith.

"Biographical Notice of Sylvanus Hanley," by E. A. Smith.

"Note on *Petricola pholadiformis*," by J. E. Cooper.

"The Corrosion of Shells in Cabinets : Supplement," by L. St. G. Byne.

Discontinuation of the Summer Meetings.

It was resolved that no meetings be held during the months of July and August.

Gift of Portrait.

It was resolved "that the best thanks of the Society be voted to the relatives of the late M. Crosse for their generous gift of copies of his portrait to accompany the obituary notice read at the May meeting."

Exhibits.

By Mr. R. D. Darbishire : A fine series of *Pediculariæ* from various localities.

By Mr. R. Standen : *Pedicularia californica in situ* on *Allopora*.

By Mr. R. Cairns : *Leucorhynchia tricarinata*, Lifu (the third known).

By Mr. W. Moss : *Hyalinia draparnaldi* from Lucerne.

By Mr. J. E. Cooper : A fine series of British *Petricola pholadiformis*.

282nd Meeting, September 13th, 1899.

Mr. E. Collier in the chair.

Donations to the Library announced and thanks voted :

Chicago Academy of Sciences, Bulletin no. 2, Fortieth Annual Report ; the Irish Naturalist, vol. 8, nos. 7-9 ; the Scottish Naturalist, no. 31 ; the Naturalist, nos. 510-512 ; Science Gossip, nos. 62-64 ; Manchester Microscopical Society, Annual Report, 1898 ; La Feuille des Jeunes Naturalistes, nos. 344-347 : Journal de Conchyliologie, vol. 47, no. 2 ; the Nautilus, vol. 13, nos. 2-5 ; Transactions of the St. Louis Academy of Sciences, vol. 8, nos. 8-12, vol. 9, nos. 1-7 ; Société Royale Malacologique, Brussels, Annales, Tome 32, 1897, Bulletin, Tome 34, nos. 3-6 ; Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. 43, part 4 ; Biographical Notice of H. T. Soppitt, by C. Crossland ; Synopsis of the Recent and Tertiary Leptonacea of North America and the West Indies, by W. H. Dall ; Tunicata of the Australian Museum, Sydney, N.S.W., by W. A. Herdman ; La Faune Malacologique du Congo, by Hugo de Cort ; Manchester Museum Report, 1898-99 ; Armature of Helicoid Land Shells, by G. K. Gude ; Report on the Marine Mollusca obtained during the First Expedition of Prof. A. C. Haddon to the Torres Straits, in 1888-89, by J. C. Melvill and R. Standen ; Further Con-

tributions towards a Check-List of the Non-Marine Molluscan Fauna of South Africa, with descriptions of Fourteen New Species, by J. C. Melvill and J. H. Ponsonby.

Donations to Cabinet announced and thanks voted:

By Dr. G.W. Chaster: Specimens of *Limnæa stagnalis* and *L. peregra* exhibited in illustration of his paper.

By Mr. A. G. Stubbs: A fine series of land shells from Mentone, including *Helix pisana* var. *alba*, *H. cespitum*, *Buliminus quadridens*, *Clausilia solida*, *Helix elegans*, *Leucochroa candidissima* var., *Rumina decollata*, and *Pupa cinerea*.

New Members Elected.

Mr. J. C. Mansel-Pleydell, B.A., F.L.S., F.G.S., D.L., Whatcombe, Dorset.

Mr. W. Neville Sturt, India Office, Westminster, London, S.W.

Mr. J. Williams-Vaughan, J.P., The Skreen, Erwood, R.S.O., Radnorshire.

Candidates Proposed for Membership.

Mr. Ernest Le Cronier Lancaster; Mr. R. M. Lightfoot; Mr. V. V. Ramanan.

Papers Read.

"A cross between *Limnæa stagnalis* and *L. auricularia*," by G. W. Chaster.

"The Etymology of the names Azeca and Assiminea of Leach," by Rev. G. A. Frank Knight.

Statement of Accounts.

The Balance Sheet for the year 1898 was laid upon the table, and ordered to be brought up for approval at the Annual Meeting.

BALANCE SHEET, Dec. 31st, 1898.

Receipts.	£	s.	d.
Balance from 1897	3	0	11½
Subscriptions received in 1898	49	3	0
Life Composition Fees	8	6	6
Donations	0	5	6
Stamps refunded by Inland Revenue Authorities ...	2	1	8
Sale of Reprints, Lists, and Back Nos. of Journals ...	17	16	1
Advertisements	3	0	0
	£83	13	8½

(*Signed*) R. CAIRNS, E. C. STUMP, } *Auditors.*

Payments.	£	s.	d.
Cost of Journals, vol. viii., no. 13, and Jan., 1898	43	8	1½
Stationery	2	14	1
Cost of Reprints, Plates, etc.	9	10	7
Drawing Plate of Madras and Falkland Mollusca	2	2	0
2nd Instal. of Purchase Money of Q. J. of Conchology, to J. W. Taylor, Esq. ...	10	0	0
Rent of Room for Annual Meeting, Oct. 22nd, 1898	1	12	0
Treasurer's Expenses	3	13	11
Secretary's and Editor's Exp's	9	18	0
Balance	0	15	0
	£83	13	8½

Exhibits.

By Mr. F. Taylor: *Limnæa palustris* monst. *decollata*, from near Oldham; *L. peregra* var. *labiosa*, Littlemoss, Ashton-under-Lyne; *Bythinia tentaculata*, a peculiar elongate variety, from Droylesden; *Succinea putris*, of large size, and var. *alba*, *Vertigo moulinsiana*, *V. pygmæa*, *V. antivertigo*, *Helix pygmæa*, *Limnæa palustris* var., *Viviparus contectus*, type and a small dark-purple variety, all from Wicken Fen, Cambridgeshire; *Vertigo andrusiana*, Douglas County, Oregon, U.S.; and *Triodopsis tridentata* var. *alba*, Hamilton, Ontario.

By Mr. W. Moss: *Clausilia biplicata* var. *alba*, from Mortlake; *Streptaxis* and *Alycæus*, from Hipoh, Perak.

By Mr. Thomas Rogers: Mitræ from Sandwich Islands.

By Mr. R. Standen: Series of *Eustreptaxis* and *Artemon*, Manchester Museum.

THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

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LIST OF MEMBERS.

Corrected to Dec. 13, 1899.

(With year of election; O = founder, or original member; L = Life Member; *post packets have been returned undelivered).

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1889. Bergh, Prof. Dr. Rudolph, Vestregade, Copenhagen.
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1889. Cossmann, Maurice, Ingénieur-chef des services techniques du chemin de fer du nord, 95, Rue de Maubeuge, Paris.
1897. Dall, Wm. Healey, Smithsonian Institution, Washington, U.S.A.
1878. Kobelt, Dr. Wilhelm, Schwanheim, Frankfurt-am-Main.
1886. Martens, Dr. Eduard von, C.M.Z.S., Paulstrasse, Berlin, N. W.
O Nelson, William, Gandy Row, Crossgates, Leeds.
1889. Philippi, Dr. R. A., Director del Museo Nacional, Santiago, Chile.
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1889. Simroth, Dr. Heinrich, Gohlis, Leipzig.

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1895. Arnold, Bernard, F.L.S., Milton Lodge, Gravesend.
1886. Baillie, William, Brora, near Golspie, Sutherlandshire.

1897. Baldwin, D. D., M.A., Haiker, Maui, Hawaiian Islands.
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1895. Barker, Reginald Hawksworth, Grosvenor Bank, Scarborough.
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1897. Beddome, Charles Edward, Hillgrove, near Hobart, Tasmania.
1886. Bendall, Wilfrid, 77, Baker Street, Portman Square, London, W.
1897. Blackburn, Rev. Ed. Percy, Hoyland, near Barnsley.
1897. Blackmore, Jas. Chanter, F.G.S., Falkirk, Chatley Road, Clifton, Bristol.
1899. Blackshaw, James C., 158, Penn Road, Wolverhampton.
1899. Bladen, W. Wells, Stone, Staffordshire.
1897. Blake, Wm. Charles, 2, Acacia Villas, Ross, Herefordshire.
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1897. Bliss, Joseph, Smyrna, Asia Minor.
1899. Blundell. Mrs. Jessie M., Argyll House, Cirencester.
1897. Bolton, Herbert, F.R.S.E., Museum, Bristol.
1895. Booth, George Albert, F.E.S., Fern Hill, Grange-over-Sands.
1884. Bostock, Edwin D., Tixall Lodge, Tixall, Stafford.
1895. Bowell, E. W. W., Mostyn House School, Parkgate, Cheshire.
1897, Boycott, Arthur Edwin, The Grange, Hereford,
1896. Brass, John George, The Grove, Barnard Castle.
1879. Brazier, John, F.L.S., C.M.Z.S., Curaçoa House, 82, Windmill Street, Sydney, N.S.W.
1893. Brierley, Mrs. H. G., Glen View, Gledholt, Huddersfield.
1899. Brooksbank, Hugh, M.B., B.C., B.A., College Road, Windermere.
1897. *Z* Bullen, Rev. Robert Ashington, B.A., F.G.S., Axeland, Horley, Surrey.
1896. Burgess, Wm. Valentine, 9, York Road, Chorlton-cum-Hardy.
1897. Burnup, Henry Clifden, Jesmond, Pietermaritzburg, Natal.
1879. Butterell, J. Darker, Manor House, Wansford, Hull.
1888. Byne, Loftus St. George, M.Sc., 8, Sea-View Terrace, Seaton, Devon.

1891. Cairns, Robert, 159, Queen Street, Hurst, Ashton-under-Lyne.
1893. Carphin, Mrs. Janet, 7, Lockerbie Cottages, Liberton, Edinburgh.
1878. Cash, William, F.G.S., F.R.M.S., 26, Mayfield Terrace, Halifax.
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1889. Christy, Robert Miller, F.L.S., Pryors, Broomfield, nr. Chelmsford, Essex.
1897. Claremont, Dr. C. C., Millbrook House, Hampstead Road, London.
1893. Clark, James, M.A., Ph.D., Ass.R.C.S., Yorkshire College, Leeds.
1898. Clifton, Francis R., 24, Park Street, Stoke Newington.
1886. Coates, Henry, F.R.S.E., Pitcullen House, Perth,
1880. Collier, Edwd., Carlton House, Whalley Range, Manchester.
1895. Collier, Frank, Carlton House, Whalley Range, Manchester.
1898. Collinge, Walter Ed., F.Z.S., Mason College, Birmingham.
1897. Cook, Rev. Thomas, Whinwood, Westcliff Grove, Harrogate.
1892. Cooper, James Eddowes, 68, North Hill, London, N.
1895. Corker, Jas. S., 59, Darncombe Street, Moss Side, Manchester.
1899. Crampton, C. B., M.B., C.M., 28, Barton Street, Greenheys.
1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony.

1886. Crick, Walter D., Nine Springs, Cliftonville, Northampton.
1896 Crofton, Rev. Addison, M.A., Linton Court, Settle, Yorkshire.
1888. Crouch, Walter, F.Z.S., Grafton House, Wellesley Road, Wanstead, Essex.
1899. Crowther, J. E., Portland Street, Elland.

1886. DaCosta, Solomon J., 2, Craven Hill, London.
1897. Dacie, John Charles, 14, Montserrat Road, Putney, London, S.W.
1893. Daniel, A. T., M.A., Richmond Terrace, Shelton, Stoke-on-Trent.
1886. Darbishire, Robert D., Victoria Park, Manchester.
1899. Darnbrough, Frederick, Croft Villa, Eaglesliffe, Yarm-on-Tees.
1897. Dautzenberg, Ph., 213, Rue de l' Université, Paris.
1889. Dawson, Oswald, Seacroft, Leeds; and Albion Walk Chambers, Leeds.
1898. Dean, John D., 2, Clarendon Road, Whalley Range, Manchester.
1892. Dixon, James Bassett, Ribblesdale House, Preston.

1892. Eccles, John Christopher, 20, Winckley Square, Preston.
1895. Edwards, J. Sumner, 6, Woodland Grove, Chapeltown Road, Leeds.
1895. Edwards, Thos., Cliftonville House, Equity Rd., Narborough Rd, Leicester.
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1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
1888. Evans, Mrs. A., sen., Brimscombe Court, Thrupp, near Stroud.
1894. Evans, Wm., F.R.S.E., 18A, Morningside Park, Edinburgh.
1897. *Evans-Thomas, Owen G., 83, Onslow Gardens, London, S.W.
1886. Eyre, Rev. W. L. W., M.A., Swarraton Rectory, Alresford, Hants.

1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
1897. Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorkshire.
1890. Fierke, Frederick Wm., 52, Francis Street West, Hull.
1884. *L* Fitzgerald, Rev. H. Purefoy, Wellington College, Berks.
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1898. Fitzsimons, J. B., M.D., 14, Owen Street, Hereford.
1892. Fulton, Hugh, 15, Station Parade, Kew Gardens.

1886. Gain, Wm. Albert, Tuxford, Newark, Notts.
1895. Gamble, Frederick Wm., M.Sc.(Vict.), The Owens College, Manchester.
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1889. Gaskell, Roger, M.A., 5, The Grove, Highgate, London, N.
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1898. Glover, Miss Maria, 124, Manchester Road, Southport.
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1886. Greene, Rev. Carleton, M.A., Great Barford Vicarage, St. Neots.
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1886. Gwatkin, Rev. Prof. H. M., M.A., LL.D., Brantham Rectory, Manningtree.

1897. Hall, Thos. Bird, Larch Wood, Rock Ferry.
1895. Hann, Rev. Adam, 14, The Crescent, Gateshead.
1895. Hardy, John Ray, The Museum, Owens College, Manchester.
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1887. Hey, Thomas, 8, Bloomfield Street, Derby.
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1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham Gardens, London, S.W.
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1895. Hudson, Rev. Hy. A., 1, Johnson Street, Cheetham, Manchester.

1886. James, John H., A.R.I.Cornwall, 3, Truro Vean Terrace, Truro.
1891. Jenner, James Herbert Augustus, F.E.S., Eastgate House, Lewes.
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1888. Jones, Wm. Jas., jun., 76, Mayes Road, Woodgreen, London, N.
1889. Jordan, H. K., F.G.S., The Knoll, Clytha Park, Newport, Monmouthshire.

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1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
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1878. Leicester, Alfred, The Mount, Aston Clinton, Bucks.
1899. Lightfoot, Robert M., South African Museum, Cape Town.
1896. Linton, John, 25, Wordsworth Road, Smallheath, Birmingham.
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1895. Loydell, A., 36, Milton Road, Acton, London, W.
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1885. McKean, Kenneth, F.L.S., Lloyds, London, E.C.
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1884. Madison, James, 167, Bradford Street, Birmingham.

1899. Mansel-Pleydell, J. C., B.A., F.L.S., F.G.S., D.T., Whatcombe, Dorset.
1885. Marquand, Ernest D., Belle Vue, Alderney.
1887. Marshall, J. T., Sevenoaks, Torquay, Devonshire.
1887. Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
1899. Mason, G. Edward, 11B, Stanford Place, Stanley Bridge, Fulham, S.W.
1888. Mason, Philip Brooke, J.P., M.R.C.S., F.L.S., F.Z.S., Trent House, Burton-on-Trent.
1897. May, William Lewis, F.R.S. Tasm., Forest Hill, Sandford, Tasmania.
1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
1880. Melvill, James Cosmo, M.A., F.L.S., Brook House, Prestwich, Manchester
1891. Middleton, Robert, Gledhow, near Leeds.
1888. Milne, J. Grafton, Holly House, Plaistow, London, E.
1879. Milnes, Rev. Herbert, M.A., The Friars, Priory St., Cheltenham.
1891. Mitchell, James, 240, Darnley Street, Pollokshields, Glasgow.
1891. Morris, Cecil Herbert, Lewes, Sussex.
1899. Morris, G. M., 18, Northen Grove, W. Didsbury, Manchester.
1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.

1899. Neild, J. E., Gilda Brook Road, Eccles.
1887. Newstead, A. H. L., B.A., Rose Villa, Prospect Road, Snakes Lane, Woodford Green, Essex.
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1891. Norman, Rev. Canon Alfred Merle, D.C.L., F.R.S., F.L.S., etc., The Red House, Berkhampstead.

1887. Oldham, Charles, Alderley Edge, Cheshire.
1899. Orr, Hugh Lamont, 29, Garfield Street, Belfast.
1896. Overton, Harry, Ingleside, Clifton Road, Sutton Coldfield, Warwickshire.

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1895. Powell, Mrs. A., Nant-y-Velin, Criccieth, N. Wales.
1897. Preston, Hugh Berthon, The Manor House, Berrow, nr. Burnham, Somerset

1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
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1887. Reader, Thomas W., F.G.S., 171, Hemingford Rd., Barnsbury, London, N.
1896. Rhodes, John, F.E.S., 360, Blackburn Road, Accrington.
1898. Roberts, A. William Rymer, Annesdale, Windermere.
O Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
1886. Rogers, Thomas, 27, Oldham Road, Manchester.
1893. Roseburgh, John, 54, Market Street, Galashiels.
1892. Rosevear, John Burman, 109, New King's Rd., Fulham, London, S.W.

1877. Scharff, Robert F., Ph.D., B.Sc., M.R.I.A., Tudor House, Dundrum, Dublin.
1893. Scharff, W. E., c/o Edwards, Scharff & Co., Bradford, Yorks.
1895. Schill, C. H., Broome House, Didsbury, near Manchester.
1886. Scott, Thomas, F.L.S., 14, Lorne Street, Leith, N.B.
1893. Shackleford, Rev. Lewis John, 16, Pimlico Road, Clitheroe, Lancs.
1892. Shillito, John G., 20, Elmore Road, Sheffield.
1895. Sich, Alfred, F.E.S., Brentwood, 65, Barrowgate Rd., Chiswick, Middlesex.
1896. Sidebotham, Dr. E. J., Erlesdene, Bowdon, Cheshire.
1884. Skilton, Mrs. Mary, 21, London Road, Brentford, Middlesex.
1886. Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideford, N. Devon.
1886. Smith, Edgar A., F.Z.S., Natural History Museum, S. Kensington, London, S.W.
1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
1899. *L* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
1894. Smith, Wm. Chas., Vanston House, 7, Vanston Place, Walham Green, Fulham, London, S.W.
1896. Smith, Wm. Rayson, Harleston, Norfolk.
1886. *L* Somerville, Alexander, B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow
1887. Somerville, Rev. James E., M.A., B.D., Castellar, Crieff, N.B.
1886. Sowerby, Geo. Brettingham, F.L.S., 15, Station Parade, Kew Gardens.
1892. Span, Bartlet, Woodlands, Tenby, South Wales.
1896. Sparkes, Thomas, 92, Heywood Street, Moss Side, Manchester.
1886. Standen, Robert, 40, Palmerston Street, Moss Side, Manchester.
1888. Stanley, Frederick, Rokeby, Edgar Road, Margate, Kent.
1888. Stirrup, Mark, F.G.S., High Thorn, Bowdon, Cheshire.
1896. Stonestreet, Rev. W. T., 12, Wellington St., Higher Broughton, Manchester.
1885. Storey, J. A., B.A., St. Joseph's High School, Cardiff.
1897. Stracey, Bernard, University Union, Edinburgh.
1890. Stubbs, Arthur Goodwin, 2, Deer Park Villas, Tenby.
1893. Stump, Edward Consterdine, 16, Herbert St., Moss Side, Manchester.
1899. Sturt, W. Neville, India Office, Westminster, London, S.W.
1895. Swanton, E. W., The Educational Museum, Haslemere.
1888. Sykes, Ernest Ruthven, B.A., 3, Gray's Inn Place, Gray's Inn, London.
1895. Sykes, Robert Dardsley, Lostock Hall, near Preston.

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1897. Taylor, Rev. George W., F.R.S.Canada, F.Z.S., F.E.S., Gabriola Island, Nanaimo, British Columbia.
O Taylor, John W., F.L.S., North Grange, Horsforth, Leeds.
1898. *Thomas, G. E., 13, Vicarage Gardens, Kensington, London.
1895. Thompson, Isaac C., F.L.S., 53, Croxteth Road, Liverpool.
1886. Tomlin, J. R. Brockton, B.A., Penrhyn House, Llandaff.
1896. Tregelles, George Fox, 5, Clarence Place, Barnstaple.
1897. Tripe, Linnæus, Major-Gen., 3, Osborne Villas, Stoke, Devonport.
1897. Tulk-Hart, Eugene John, M.D., M.R.C.S., 4, Gloucester Place, Brighton.
1898. Turner, E. Hartley, A.C.A., 21, Bairstow Street, Preston.
1880. Tye, G. Sherriff, 10, Richmond Road, Handsworth, Birmingham.

1899. Vaughan, J. Williams, J.P, The Skreen, Erwood, R.S.O., Radnorshire, S. Wales; winter address: Bryn-y-Mon, Tenby, S. Wales.
1897. Vignal, Louis, 28, Avenue Duquesne, Paris.

1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea.
1891. Walker, Bryant, 18, Moffat Building, Detroit, Michigan, U.S.A.
1896. Wallace, Harry Simpson, Art Gallery, Newcastle-on-Tyne.
1886. Watson, Rev. Robert Boog, LL.D., B.A., F.R.S.E., F.L.S., 11, Strathearn Place, Edinburgh.
1895. Webb, Wilfred Mark, F.Z.S., The Broadway, Hammersmith, London, W.
1895. Welch, Robert John, 49, Lonsdale Street, Belfast.
1897. West, H. J., 80, Upland Road, East Dulwich, S.E.
1886. Whitwell, Wm., F.L.S., 4, Thurleigh Road, Balham, London, S.W.
1889. Williams, John M., 4, Exchange Alley, Liverpool.
1891. Williamson, Rev. Charles Arthur, M.A., 14, Upper Mount Street, Dublin.
1899. Wilson, Arthur Ernest, 228, Victoria Street, Grimsby.
1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
1898. Woods, Henry, M.A., F.G.S., St. John's College, Cambridge.
1886. *L* Woodward, Bernard B., F.G.S., F.R.M.S., 120, The Grove, Ealing London, W.
1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

283rd (Annual) Meeting, October 21st, 1899.

Mr. J. Cosmo Melvill in the chair.

The chairman announced with great regret that the President, Mr. Lionel E. Adams, had been suddenly called away by telegram to the bedside of his brother, who was seriously ill.

Appointment of Scrutineers.

Messrs. W. Wells Bladen and R. Standen were appointed Scrutineers.

Appointment of Auditors.

Messrs. E. Collier and E. C. Stump were appointed Auditors.

Annual Reports and Balance Sheet.

The Annual Report of the Council (see page 265), the Reports of the London and Leeds Branches (see page 267), and the Treasurer's Report, including the Balance Sheet for 1898 (see page 256), and an interim Balance Sheet and Financial Statement for the current year up to date (see page 266) were presented and adopted.

Election of Office-Bearers.

The Scrutineers reported that forty-three valid voting-papers had been handed in, of which forty voted for the list as nominated by the Council. The list was therefore declared carried (see page 257).

New Members Elected.

Mr. Ernest Le Cronier Lancaster, B.A., M.B., Winchester House, Swansea.
Mr. Robert M. Lightfoot, South African Museum, Capetown.
Mr. V. V. Ramanan, B.A., Pycroft Road, Triplicane, Madras.

Candidate Proposed for Membership.

Mr. Joseph W. Baldwin.

Resignation of Members.

Mr. Frank Coulson; Mr. J. H. Killingbeck; Mr. John Wishart.

Place of Meeting.

Invitations were received from the newly-elected President, Mr. E. R. Sykes, to hold the next annual meeting in London; and from Mr. J. Cosmo Melvill, on behalf of the committee of the Manchester Museum, to hold it in Manchester. It was resolved that the matter be remitted to the Council for decision.

The Presidential Address

Entitled: "Observations on some Rare British Land and Freshwater Mollusca," was read by Mr. J. Cosmo Melvill, in the absence of the retiring President, Mr. Lionel E. Adams.

On the motion of Mr. E. R. Sykes, seconded by Mr. C. E. Wright, a vote was unanimously passed expressing the Society's regret at the absence of the President, and its sympathy with him in the illness of his brother, as well as its best thanks for his services in the presidential chair during the past year and for his address.

Exhibits:

By Mr. J. R. B. Masefield: (*A*), series of *Helix pisana*, *H. nemoralis* var. *castanea*, *Planorbis corneus*, and *Dreissensia polymorpha*, shewing growth stages of the shell; (*B*), *Helix virgata*, type and a curious variety, from Wren's Nest, Dudley, Staffordshire (first record for the county), collected by Mr. A. Wood, 1899; (*C*), *Bulimus* (*Opeas*) *goodalli* Mill., original specimens from pine beds at Bristol (Leckenby collection); (*D*), *Cyclostoma elegans*, *Clausilia laminata*, *Helix cantiana*, *H. ericetorum*, and *H. virgata*, from near Aylesbury, Bucks., collected by Mr. W. G. Stephenson, 1899.

By Mr. F. Taylor: *Paludestrina jenkinsi* Smith, from Droylesden, Lancs.

By Mr. W. C. Blake: *Helix virgata* var. *lutescens*, from Ross, Herts. (first county record), and a very perfect scalariform *Helix aspersa* from the same locality.

By Mr. W. Wells Bladen: *Dreissensia polymorpha*, with very fine attached pearl, from Rugeley; and series of *Helix aspersa* from Eccleshall, Staffs.

By Mr. J. M. Williams: Some remarkable forms of *Cypræa tesselata*, *C. pantherina*, *C. vitellus*, *C. picta*, *C. zizac*, *C. caput-serpentis*, *C. ventriculus*, *C. arabica*, *C. pulchella*, and *C. gaskoini* var. *peasi*.

By Mr. E. D. Bostock: Series of *Helix aspersa* from Eccleshall.

By Mr. Ed. Collier: *Helix nemoralis*, principally from Valencia Island, Ireland, including var. *albolabiata* with a very broad black single band (00300); also a large number of land and freshwater shells, including *Vertigo*, *Pupa*, *Acme*, *Carychium*, &c.

By Mr. R. Standen: A number of shell dress ornaments; strings of "shell-money" (*Nassa* and *Cypræa*), and specimens of *Amphiperas* bored for wearing; armlets cut from large *Trochus*; shell necklaces, &c., collected by Professor Haddon during his recent expedition to Torres Straits.

By Mr. J. Cosmo Melvill: A fine example of the rare *Mitra fergusoni* Sow., of which only one other specimen (the type) is known.

By Mr. J. Linton: A selection of the less common species of *Terebra*, *Nassa*, *Clausilia*, and other genera.

By Mr. A. G. Stubbs: A collection of the land shells of Mentone.

By Mr. E. R. Sykes: *Cyclophorus eximius* Mouss. from Java, and *C. dodrans* Mab. from Tonkin—the two largest land Operculates known, the former measuring over seventy mm. across, and a specimen of *Streptaxis candidus* Spix thirty-nine mm. in diameter, from Brazil.

By Mr. C. E. Wright: *Helix ericetorum* var. *alba*, Blisworth and Stony Stratford; *H. ericetorum* m. *scalariforme*, and vars. *leucozona* and *minor*, Middleton, Northants; *Limnæa auricularia*, showing extra lip growth, Newton, Northants; *Helix hortensis*

various missing bands, Gretton, Northants; series of *H. nemoralis*, showing variation in colour and form, Kettering; *H. nemoralis* var. *alba*, and var. *nigrolabiata*, Woodford, Northants; *H. arbustorum* var. *canigonensis*, Rushton, Northants.

By Mr. R. Welch: *H. ericetorum* m. *sinistrorsum*, and var. *alba*, Bundoran; *H. nemoralis* m. *sinistrorsum*, and m. *scalariforme*, Bundoran, with others showing malformed umbilicus due to injury in early growth; also large series of *Succinea putris* and *S. elegans*, S. Ireland.

By the Rev. J. W. Horsley: Series of *Helix nemoralis*, showing varied banding, and var. *roseolabiata*, N. Kent.

ANNUAL REPORT, 1898—99.

THIS has been a singularly uneventful year in the history of the Conchological Society, which has continued on the usual lines to carry out a programme of steady and satisfactory work.

It is just a year since the last Annual Meeting was held at Stafford and this report therefore covers a period of twelve months and includes nine meetings.

There has been a very satisfactory increase in the accession of new members and we are glad to note that there have been twenty-two elections; four resignations, two deaths and two defaulting members give a clear gain of fourteen, so that the Society now counts 254, as against 240 members. Of these 23 reside abroad, 10 are honorary, and 244 are ordinary members of the Society.

The Council deeply regrets to have to record the death of Mr. Sylvanus Hanley, of whose life an account, written by Mr. E. A. Smith, will appear in the January number of the Journal. We have further to deplore the loss of Mr. L. F. Biddle, who died very shortly after his election to the Society.

The Council has pleasure in announcing that Mr. William Healey Dall, of the Smithsonian Institution, Washington, has been elected an honorary member of the Society in the place of Mons. Crosse, who died last year.

The attendance at the monthly meetings in the Manchester Museum has been good throughout the year, and in accordance with a resolution passed at the June meeting the July and August meetings were omitted and the Society resumed work on the 13th of September.

There has been no falling off in the number of papers, notes and exhibits, of which a list has already appeared in the reports of the Society's proceedings.

Four numbers of the Journal have been published as usual during the current year and these have contained 128 pages, one portrait and one plate. The portrait, which accompanied the account of Mons. Crosse's life, was kindly presented to the Society by his family, and at the June meeting a vote of thanks for this generous gift was passed. The cost of the plate, which appeared in the last number of the Journal, in illustration of Mr. E. A. Smith's paper on South African marine shells, was partly defrayed by a contribution from Mr. J. H. Ponsonby, to whom the best thanks of the Council were conveyed after the September meeting.

Some valuable additions, both of British and foreign shells, have been made to the Society's collections. These have been arranged by the Curator, who has also identified a considerable number of specimens submitted to him by members. A number of members and their friends have, from time to time, inspected and consulted the Society's collection.

The Library has been enriched by the usual exchanges with other Societies and Journals and by gifts of books and pamphlets from members and others, which have been duly acknowledged in the Proceedings. It has been well used by members, and the catalogue has been kept up to date.

The Council begs to draw the special attention of members to the heavy adverse balance shown by the Treasurer's report and to remind them that if the Journal is to be maintained in its present enlarged form, it will be necessary for some special exertion to be made in order to raise very considerably the number of members in the Society. It is only by the hearty co-operation of every member that such a Society as ours can prosper and progress.

TREASURER'S REPORT.

In presenting this Annual Report I must call attention to the Balance Sheet for the year 1898, which has already been audited and printed in the Journal (see p. 256).

The Council have also instructed me to prepare an interim Balance Sheet for the present year, up to Oct. 16th, which is as follows :—

Receipts.	£	s.	d.
Subscriptions	54	5	0
Life Composition Fee... ...	3	3	0
Donation	1	0	0
Sale of Publications	5	10	10½
	£63	18	10½

Expenditure.	£	s.	d.
Journals for April, July, and October, 1898	38	6	5
Reprints	0	14	0
Stationery	6	8	0
Bookbinding	1	6	3
Printing Plates	4	10	0
Photographing specimens ...	0	10	0
Treasurer's expenses	1	19	0
Editor's expenses...	7	4	9½
Balance	3	0	5
	£63	18	10½

It is now my unpleasant duty to make a statement as to the Society's financial position, which is far from satisfactory. At the present moment the Society has liabilities to the extent of about £65, of which amount £10 is due for the third instalment of the purchase-money of the *Journal of Conchology*, and the rest is for the cost of printing the Journals for this year, and various small accounts. Against this adverse balance we have in hand the sum of £3, and about £12 for arrears of subscriptions paid up to the present.

At the Council meeting just held the Society's finances have been very seriously considered, and it has been decided to make a special effort to pay off these outstanding accounts. An appeal will shortly be made to all the members of the Society for assistance, and I am pleased to say that the following amounts have been already promised :—

	£	s.	d.
Mr. Collier - - - - - -	2	2	0
Mr. Melvill - - - - - -	2	2	0
Mr. Bostock - - - - - -	2	2	0
Mr. Hoyle - - - - - -	1	11	6
Mr. Masefield - - - - -	1	1	0
Mr. Byne - - - - - -	0	10	6
Mr. Standen - - - - - -	0	10	6

I trust this example will be readily followed by the other members of the society.

E. D. BOSTOCK, *Treasurer.*

LONDON BRANCH—Annual Report.

During the past year there have been thirteen meetings of this branch, seven of which were field meetings. The attendance at most was somewhat disappointing. As we have had a very dry summer it has been almost impossible to collect land shells; freshwater collecting was fairly successful. Messrs. J. C. Dacie, A. S. Poore, J. B. Rosevear, and W. M. Webb, F.Z.S., kindly invited us to see their collections on various dates during the past winter; we are also indebted to Dr. Tuke, of Chiswick, for permission to visit his grounds. Our president, Rev. J. W. Horsley, brought his annual consignment of living Swiss mollusca to the June meeting. The membership of this branch is about the same as it was a year ago.

11th Sept., 1899. *(Signed)* J. E. Cooper, *Hon. Sec.*

LEEDS BRANCH—Annual Report.

The last Annual Meeting was held at Crossgates, on the 22nd April, 1898, when Mr. H. Crowther, F.R.M.S., was elected President, and the two Hon. Secretaries, Mr. W. Denison Roebuck, F.L.S., and Mr. W. Nelson, were re-elected.

The papers read have been more numerous than during the preceding year, and several of them have been printed in *The Naturalist*. The papers so published include two by Mr. Nelson, in which he described visits to Wiston and Cawood, and to Camblesforth and Gowdall in search of *Limnæa glabra*. Also a short paper by Mr. J. Hawkins on "Food as Influencing Variation in Helices," communicated through Mr. J. W. Taylor, F.L.S. A short paper by the President "On the Bionomics of the Mollusca inhabiting the Scar at Whitby," and a brief note by him on the "Occurrence of *Planorbis corneus* in flood-refuse at Skipton." Two papers dealing with subjects beyond the geographical scope of *The Naturalist* have been printed at length in the Weekly Supplement of the *Leeds Mercury*. In one of these Mr. Nelson recounted "A Conchological Pilgrimage to Loch Skene in search of *Limnæa burnetti*," and in the other the President gave an account of Mr. Moore's investigations of the peculiar molluscan fauna of Lake Tanganyika.

Of papers and addresses not intended for publication, Mr. J. W. Taylor, F.L.S., gave an account of the classification of molluscan teeth. Mr. Cash, F.G.S., gave an account of the distribution and variation of the Achatinellæ of the Sandwich Islands; and Mr. Broadhead initiated an interesting discussion of some points in evolution, more especially as bearing on the mollusca. The exhibits have been very numerous at all the meetings, and of much value and interest.

On the whole the Club is to be congratulated upon the sound and satisfactory position which it now occupies, as well as upon the success of the quiet and unassuming work done by its members.

(Signed) W. Denison Roebuck, Wm. Nelson, } *Hon. Secs.*

April 15th, 1899.

284th Meeting, November 8th, 1899.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted:

Cleveland Naturalists' Field Club, Record of Proceedings, 1896-98; Synopsis of the Solenidæ of North America and the Antilles, by W. H. Dall; Notes on *Paludestrina jenkinsi* and *P. confusa*, by A. S. Kennard and B. B. Woodward; Pontus und Mittelmeer, by W. Kobelt, and the usual periodicals received in exchange.

Donation to Cabinet announced and thanks voted :
By A. G. Stubbs : A series of land shells from Thanet, Kent.

New Member Elected.

Mr. Joseph W. Baldwin, Darwen Road, Dunscar, near Bolton.

Resignation.

Mr. F. W. Wotton.

Papers Read.

" *Pisidium milium* in Somerset," by Chas. Oldham.
" *Paludestrina jenkinsi* at Droylesden, Lancashire," by F. Taylor.
"Note on the appearance of *Helix virgata* in Herefordshire," by W. Blake.
" *Helix virgata* in Staffordshire," by J. R. B. Masefield.
" Buckinghamshire Mollusca," by J. R. B. Masefield.
" *Clausilia biplicata* (Mont.)," by R. Standen.

Exhibits.

By Mr. A. G. Stubbs : Land shells from Mentone, and Thanet, Kent.
By Mr. Ed. Collier : *Helix nemoralis*, from Valencia Island, Ireland.
By Mr. R. Welch : *Succinea oblonga* var. *arenaria* from Enniskillen, Ireland.

285th Meeting, December 13th, 1899.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted :

Description of *Conus* (*Cylinder*) *clytospira*, sp. nov , from the Arabian Sea, by J. C. Melvill and R. Standen ; the Terrestrial Mollusca of Michigan, by Bryant Walker ; a Monograph of the Land and Freshwater Mollusca of the British Isles (part 5), by John W. Taylor ; and the usual periodicals received in exchange.

Resignation.

R. Wigglesworth.

Candidates Proposed for Membership.

Dr. G. H. Broadbent ; Mr. Hugh Watson ; Mr. Walter F. Webb.

Member Deceased.

Sir Rawson W. Rawson, K.C.M.G., C.B.

Papers Read.

" Sir Rawson W. Rawson, K.C.M.G., C.B.," by J. Cosmo Melvill.
"*Helix marmorata* var. *alba*," by K. Hurlstone Jones.
" A Revision of the Textile Cones, with description of *C. cholmonde'eyi*, n.sp.," by J. Cosmo Melvill.

Exhibits.

By Mr. W. Moss : *Ariophanta labalensis* de Morgan, from Perak.

By Mr. F. Taylor : A series of *Vertigo substriata*, showing stages of growth, from Ashton-under-Lyne.

By Mr. J. C. Melvill, Mr. R. D. Darbishire, Mr. J. R. Hardy, and the Manchester Museum, a large number of Textile Cones, including the new species described in Mr. Melvill's paper.

By Mr. R. D. Darbishire : A bait for catching cuttlefish, composed of pieces of cowry shells.

By Mr. R. Welch : A series of *Succinea oblonga* var. *arenaria* from continental localities, and a series of the variety figured by Jeffreys (B.C., vol. 1, p. 155), from the Waller Collection.

SYLVANUS HANLEY.

By EDGAR A. SMITH, F.Z.S.

(Read before the Society, June 14th, 1899).

By the death of Sylvanus Hanley conchological science has lost one of its most careful and excellent students. As far as the writer of these remarks can judge, no conchologist with whom he has been personally acquainted has devoted more care to his work than Mr. Hanley. Thoroughness being his motto, it results that his monographs, produced forty to fifty years ago, still remain standard works upon their respective subjects. His writings upon mollusca consist of separate works, monographs of special groups, and descriptive papers :—

(*A*). Separate Works.

1841. Exotic Conchology, ed. 2.
1842. The Conchologist's Book of Species.
1842-1856. An Illustrated and Descriptive Catalogue of recent Bivalve Shells.
1848-1853. A History of British Mollusca and their Shells. (Shell portion).
1855. Ipsa Linnæi Conchylia. The Shells of Linnæus, determined from his Manuscripts and Collection.
1854-1858. The Conchological Miscellany.
1870-1876. Conchologia Indica. Illustrations of the Land and Freshwater Shells of British India.

(*B*). Monographs.

1846. The Genus Tellina.
1860. The Family Nuculidæ.
1863. The Genus Solarium.

} In Sowerby's 'Thesaurus Conchyliorum.'

(*C*). Descriptive and Miscellaneous Papers.

(1). Twenty-nine Papers in the *Proc. Zool. Soc.*, 1842-1882.
(2). Four Papers in *Journ. Linn. Soc.*, 1859-1885.
(3). Two Papers in the *Annals and Mag. Nat. Hist.*, 1868 and 1885.

Of his separate works, that on British Mollusca, written in conjunction with Professor Edward Forbes, is perhaps the most widely known. Probably most readers of this journal are well acquainted with the character of that work, and consequently further commendation is unnecessary. It still remains the finest work upon the subject although written half-a-century ago. The 'Ipsa Linnæi Conchylia' was a most important publication, dealing with a subject surrounded with many difficulties. The amount of pains and research expended in the

preparation of this work must have been enormous, and it is still indispensable to all workers on systematic conchology.

The 'Conchologia Indica' was merely a pictorial work, and although of considerable usefulness, leaves much to be desired in the finish of the illustrations. For this, however, the publishers were responsible rather than the author. Mr. Hanley's other separate works have been practically superseded by more modern monographs, but still call for frequent reference.

The monographs of *Tellina*, *Nuculidæ*, and *Solarium* in the 'Thesaurus Conchyliorum' are beyond question among the best in that work. Of the thirty-five descriptive papers, twenty-seven treat upon bivalve shells. The Pelecypoda had special attraction for Mr. Hanley, indeed one of his separate works was devoted entirely to their description. Attention should also be called to one of his miscellaneous papers in the Journal of Proceedings of the Linnæan Society, vol. iv., pp. 43-90, entitled "On the Linnæan Manuscript of the Museum Ulricæ," being a companion work to his treatise on the 'Ipsa Linnæi Conchylia.'

Sylvanus Charles Thorp Hanley was born at Oxford on January 7th, 1819, and, after leaving school, proceeded to Wadham College, Oxford, and in due course obtained his B.A. He subsequently became a student-at-law of the Inner Temple, but inheriting ample means from his father, he had no occasion to complete his legal studies. He was twice married; one of his sons survives him, but an elder one died some years ago. He was elected a Fellow of the Linnean Society in 1843. Conchology appears to have been his hobby practically all his life, and therefore it is not surprising that he got together a very large collection of shells, the value of which is enhanced by having been named by so eminent and careful a worker, and doubtless many important comments will be found upon the wooden tablets to which the specimens are attached. He died at Penzance on April 5th last, aged eighty years, and was interred there on the 10th of the same month.

Note on the appearance of Helix virgata in Herefordshire.—My first acquaintance with *Helix virgata* in this county was two years ago when I took the variety *lutescens*. Last year, I again met with the type and two vars. (*lutescens* and *albicans*) in my garden on the outskirts of Ross. I have given specimens for comparison to several friends, and on Oct. 12th one of my assistants informed me that while cycling that morning after rain his notice was attracted to a crackling sound from beneath the tyres of his machine. This he found to be due to a number of small snails, which turned out on examination to be *H. virgata*, spread over the road —Wm. Blake, 2, Acacia Villas, Ross *(Read before the Society*, Nov. 8th, 1899*)*.

THE ETYMOLOGY OF THE NAMES AZECA AND ASSIMINEA OF LEACH.

By the Rev. G. A. FRANK KNIGHT, M.A.

(Read before the Society, September 13th, 1899).

Enquiries have from time to time been made as to the derivation of the names *Azeca* and *Assiminea* of Leach, but hitherto all such researches have apparently been fruitless. The words still remain under the ban pronounced upon them in 1842, when the Committee of the British Association on the "Revision of Zoological and Botanical Nomenclature" singled them out for condemnation as particularly bad examples of merely "nonsense names." The report says (B.A. Rep., 1842, p. 118): "Some authors having found difficulty in selecting generic names which have not been used before, have adopted the plan of coining words at random without any derivation or meaning whatever. The following are examples—*Viralva*, *Xema*, *Azeca*, *Assiminea*, *Quedius*, *Spisula*. It is particularly annoying to the etymologist, who, after seeking in vain through the vast storehouses of human language for the parentage of such words, discovers at last that he has been pursuing an *ignis fatuus*." Succeeding reports by the same Committee in later years have not released these terms—*Azeca* and *Assiminea*—from the cloud under which they rest. Scientific workers may continue to employ them, as they have come to stay, and to change them now would cause inconvenience, but there is a distinct slur attached to these names, and they are held up as solemn warnings to all coiners of new terminology.

I propose in this paper to examine whether the condemnation is really just, and to enquire whether after all Leach may not have had a praiseworthy and consistent plan which he followed out in the naming of his genera.

Dr. William Elford Leach was born in 1790. In 1814 he started the "Zoological Miscellany," a periodical which gave to the world descriptions of many animals new and important to science. But in 1821 he retired from active supervision of this work, and during the closing years of his life he fixed his residence in Italy, and in that country, at Tortona in Piedmont, he passed away in 1836. The book by which he is remembered is his "Synopsis of the Mollusca of Great Britain," which was issued in 1852, long after his death, by Dr. J. E. Gray. Part of the work (p. 1-116) had, however, been in type and several copies had been circulated since 1820, and hence Leach's names are entitled to the benefit of the 'law of priority.' The treatise is dedicated to three distinguished foreign scientists — Jules-César Savigny, Baron G. D. Cuvier, and Jos. Xav. Poli. There are two

points here which may have a bearing on our present enquiry: (1) Leach died six years prior to the issue of the British Association rule which condemned his nomenclature, and therefore he could make no defence, and give no explanation of his reasons; and (2) the last years of his life were spent in Italy. The importance of this fact will be seen later on.

The principles which guided Leach in his choice of names have been given to us by the author himself in the introduction to his work (p. xii.): "Respecting the names that I have given to what I consider distinct genera, I have always invariably named the genera, as far as possible, from their essential characters; except only when I have perceived that the names of the parts constituting a generic distinction might probably equally apply to some other genus not yet discovered; and where I have not been enabled to find sufficient and certain essential characters, I have followed the rule laid down by Fabricius, the first naturalist who attempted to form a natural arrangement of insects, '*Nomina generica nil significantia omnino optima*,' and, as far as possible, I have selected, according to the rule laid down by the same author, that '*Nomina barbara nullo modo sunt toleranda*.'" It would be wrong to translate '*nil significantia*' as 'nonsense names'; Fabricius and Leach meant merely that in their framing of names there was no attempt made to *describe* the character of the genera represented—that is, the names had no reference to the intrinsic qualities of the genera; they were not 'definitions' so much as mere 'labels.'

In selecting names, however, which on the one hand would not carry with them any descriptive significance, and on the other hand such as would not be branded as 'barbarous,' Dr. Leach was not arbitrary. He seems to have had a special fondness for (1) geographical terms, and (2) names derived from persons. In regard to the former, he favoured such as had a flavour of antiquity, for besides visiting the great quarry of *classical* literature which has furnished all departments of science with so many names, he borrowed particularly any which had a *biblical* or *oriental* connection. Similarly with his choice of personal names. He went to classical sources for many, but it is evident that he had strong leanings towards those mentioned in Scripture, or which occur in connection with the histories and legends of eastern nations. I may indicate a few of these names which he suggested in illustration of these points, although of course it must be remembered that in many cases Leach's proposed nomenclature has been superseded.

I.—Among Leach's generic names borrowed from *geographical* sources are the following]:—

Thracia: a name taken from the ancient Roman province of Thrace, rather than, as Jeffreys suggests (B.C., vol. 3, p. 33) from Thracia, 'a sea-nymph.'

Mysia (*Diplodonta*): the province in Asia Minor, mentioned in Acts xvi., 7.

Bithynia: Mr. J. Cosmo Melvill informs me that Leach described a mollusc *Bithynia* in 1821, which Gray in the same year called *Bithinia*. Jeffreys (B.C., vol. 1, p. 59) spells the genus *Bythinia*, and has the following note:—"Although the derivation of the word *Bythinia* [inhabiting deep water] would imply that these molluscs inhabit deeper water than others of the same family, such is not the case. They generally frequent small streams, canals, shallow ponds, and ditches." Is it likely that Leach in such a flagrant manner would thus violate the rule he had laid down for his own guidance, and spell the word in such a way as to lead others to suppose that the mollusc inhabited waters the very reverse in actual condition to what was the truth? Leach himself in his 'Synopsis' (p. 209) spelled the word *Bithynia*, rightly deriving it from the well-known province of Asia Minor (Acts xvi., 7; 1 Peter i., 1) which is *βιθυνία* not *βυθινία*. Jeffreys came to see this, and in his Supplement (B.C., vol. 5, p. 151) adopts the latter geographical derivation. The Conchological Society's List in 1892 spells the word *Bythinia*, and the genus is attributed to Gray.

Thyatira (*Axinus*): the city of Lydia (Acts xvi., 14) and one of the seven churches of Asia (Rev. ii., 18).

Lasæa: Jeffreys (B.C., vol. 2, p. 217) says of this name "a meaningless name, possibly a corrupt derivation from *λαισήϊον* a little shield." He remarks on this 'meaningless' name again on p. 218, but in the Supplement (vol. 5, p. 179) he retracts, and derives the term, as it certainly should be, from "*Lasæa*, a town in Crete, mentioned in the Acts of the Apostles (Acts xxvii., 8, *Λασαία*).

Dipsas: a river of Cilicia, flowing from Mount Taurus.

Pharus (*Ceratisolen*): the famous island off Alexandria, on which the first lighthouse was built by Ptolemy II. Philadelphus, and on which, according to the tradition, the Hebrew Scriptures were translated by the 'Seventy.'

Magdala (*Lyonsia*): the town on the Lake of Galilee (Matt. xxviii., 1).

Barnea (*Pholas*): a name derived from Kadesh-Barnea, the great centre of the wanderings of the Israelites in the desert (Numb. xxxii. 8, xxxiv. 4).

Azor (*Solecurtus*): very possibly taken from Hazor which occurs

so frequently in scripture, there being five places of that name (*e.g.*, Josh. xi. i., Judg. iv. 2).

Macoma: not unlikely to have been coined from the Hebrew word מקום *makom* = 'a place.'

Oronthea (*Kellia*): probably from the river Orontes, which, from its having had Antioch situated on its banks, gave rise to one of Juvenal's most famous epigrams.

Pera (*Pisidium*): the well known quarter in the city of Constantinople.

Zacanthusa: a name derived from Zacynthus, one of the Ionian Islands, now called Zante.

Alexia: another name for Alesia (now Alise in the Côte d'Or), a famous city of Gallia Celtica, taken and destroyed by Julius Cæsar, but rebuilt, and an important town till the ninth century; or it may be from the town Alexia, situated on the Isthmus of Gallipoli.

Orixa: another name for Denis Island, one of the Seychelles Archipelago.

These examples may be sufficient to prove how fond Leach was of utilizing, as titles for his genera, names which occur in classical, but especially in biblical and oriental, geography.

II.—But again, in looking at others of Leach's genera, we see that while he employed many names of a purely classical origin, his tastes led him repeatedly to oriental and biblical personages, whose titles he readily made use of. Thus from the storehouse of truly CLASSICAL names he has borrowed the following:—

Eledone: deriving the word from Aristotle's 'Ελεδώνη.

Cydippe (*Tellina*): one of the Nereids.

Autonoë (*Lasæa*): the daughter of Cadmus and Hermione, sister of Semele, wife of Aristæus, and mother of Actæon.

From BIBLICAL sources he has derived the following:—

Damaris (*Unio*): the Athenian woman who hearkened to St. Paul (Acts xvii. 34).

Zippora (*Rissoa*): the wife of Moses (Exod. ii., 21, Sept.).

From ORIENTAL sources he has probably taken these amongst others:

Balcis (*Eulima*): Balkis was the Arabic name of the Queen of Sheba.

Sabanæa: perhaps from Saba, the seat of the government of the Queen of Sheba.

Roxania (*Bulla*): probably coined from Roxana, the famous wife of Alexander the Great.

Cadmusia (*Pholadidea*): from Cadmus, the Phœnician hero, who was credited with the introduction of the alphabet into Greece.

Gobræus (*Psammobia*): perhaps coined from Gobryas, one of the seven Persian nobles who conspired against Pseudo-Smerdis in Herodotus' famous story.

Arianta (*Helix*): from Ariantas, a king of Scythia, who, as Herodotus tells us, employed arrows in taking a census of his people.

Tachea (*Helix*): possibly suggested by, and coined from, Tachus King of Egypt in the reign of Artaxerxes Ochus.

Many others of Leach's names might be mentioned, with their probable etymologies, showing how his tastes in generic nomenclature ran in the direction of biblical and oriental types.

Azeca.—Under these circumstances is it impossible, or at all improbable, that *Azeca* is also derived from Scripture? *Azeca* is simply another way of writing *Azekah*, the name of a town of the tribe of Judah, mentioned in Josh. x. 10; 1 Sam. xvii. 1; Jerem. xxxiv. 7, etc. In the Septuagint translation, the word is 'Αζηκά, from which the term *Azeka* or *Azeca* has been derived, the final 'h' being of course, according to rule, dropped. I am not prepared to say where in common parlance it is customary to place the accent. I have frequently heard the word pronounced *Ažĕca*; but the Greek original certainly gives us the correct method, namely *Azēca*. If it be objected that Azekah is too obscure a town to have caught the attention of Dr. Leach, I would simply reply that it is mentioned *seven* times in scripture, while Lasæa is mentioned only *once*. And, moreover the mere fact that it is among the lesser known names of scripture falls in with the rule which Leach set before himself that he should select names which were destitute of any descriptive significance.

Assiminea.—Jeffreys (B.C., vol. 5, p. 97) says of this title:—"*Assiminea*, a ridiculous name"; and again (p. 98):—"This genus bears Gray's MS. name of *Nerita syncera*, and has been called *Assiminia* and *Assaminia*. With respect to the present name the author ought to have borne in mind one of Linné's laws of scientific nomenclature: '*Idiotæ imposuere nomina absurda.*'" I venture to think that Jeffreys has been too hard here on Leach. Readers of the "Decline and Fall of the Roman Empire" will recollect how frequently Gibbon acknowledges his indebtedness to the vast erudition of the great oriental scholar, Joseph Simon Assemani. He was born in 1687, and died in 1768. He was commissioned by the then Pope to visit the numerous convents in Syria and Egypt, and he returned 'laden with the spoils of the east,' in the form of many valuable manuscripts, etc., which to-day greatly enrich the Vatican library. His great

works were *Bibliotheca orientalis*, 4 vols., Romae, 1725, and *Kalendaria Ecclesiæ Universæ*, 6 vols., Romae, 1755. A Syrian Maronite, he was the first of a race of scholars each bearing the learned name of Assemani. His nephew Stephen carried on his uncle's researches, and died in 1782; another nephew, Joseph Louis, continued the family tradition of profound oriental scholarship; and the last of the celebrated family of Assemani, the Abbé Simon, who was born in 1752 at Tripoli, and who passed away at Padua in 1821, is still regarded as one of the greatest orientalists of a past generation. Now it was in this same year—1821—that Leach retired from the active editorship of the "Zoological Miscellany," and it was in North Italy, not very far from Padua, that he spent the closing years of his life. When the great oriental scholar died, the newspapers and journals, British and Italian alike, would doubtless take considerable notice of the decease of so well known a man. Biographical details would be given, and there would be many tributes to his memory and labours. What more natural, then, than that Dr. Leach, with his interest in oriental lands already so keen, should have utilized the name of one, the last of a race of scholars whose loss was everywhere deplored, and should have given it to a genus of molluscs which was then waiting for a special designation? I think, taking the whole circumstances into account—the interest that Leach had in oriental affairs, the fact that Assemani died in North Italy where Leach was residing, and the near synchronism of the dates—that we have in this the most probable derivation of a word which has puzzled many. But if my conjecture be correct, must the customary spelling of the genus be changed? It is, already, as Jeffreys indicated, very unstable, being spelled variously *Assiminea*, *Assiminia*, *Assaminea*. I am, however, averse to any alteration which is not strictly necessary, and therefore, although the correct designation of the name should be *Assemania* (if the etymology which I suggest be the true one), I would not seek to urge that this merely verbal difference should be adopted.

In closing this enquiry I may be allowed to express my indebtedness to Mr. J. Cosmo Melvill, F.L.S., and to Mr. Edgar A. Smith, F.Z.S., for their kind help in verifying some of my references.

AUCHTERARDER, PERTHSHIRE.

Pisidium milium in Somerset.—This species is not included in Mr. E. W. Swanton's list of Somerset land and freshwater mollusca, and it may interest him to know that Mr. L. E. Adams and I found it in plenty, associated with *Pisidium fontinale*, in a ditch at Dunster in August, 1892. We also took *P. pusillum*, which Mr. Swanton characterizes as a rare shell in Somerset, in ditches at Dunster and Minehead.—CHAS. OLDHAM, Alderley Edge (*Read before the Society*, Nov. 8, 1899).

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Large Colony of Vertigo antivertigo Drap. **in Co. Down.** — Five years ago while sifting a mass of flood debris from the Lagan, near Belfast, I noticed a good many specimens of Vertigo, and resolved upon a careful search along the margin of the river-canal higher up to see if their habitat could be discovered. Several visits failed to give more than a few specimens, mainly *V. pygmæa*, until this month (March, 1899) on a very cold day following three weeks' dry weather, when Messrs. H. L. Orr, Arthur W. Stelfox and myself were fortunate enough to find a very large quantity of *V. antivertigo*. The locality was Shaw's Bridge, near Belfast, amongst clumps of rushes in a marshy corner, which is much subject to flooding after heavy rains. We cut off a section of earth with the base of the stems about two to three inches thick across the mass close to the ground, and about ten by six inches in area; of this I took half and from it obtained seventy specimens, all alive, and in clean, nice condition; while Mr. Orr obtained about as many more from his portion of the mass. We were rather surprised at this result, as on superficial examination twenty to thirty more were all that could be expected. Other clusters of rushes seemed equally rich, and cutting off some half-dozen bunches of stems as large as could be held in the hand, we shook them over a newspaper, and on subsequent sifting obtained 330 specimens, making over 400 in all as my share, from an area not larger than thirty by twenty feet. With these were a larger number of *Carychium minimum*, a few *Helix pygmæa*, and many young *Succinea* (sp. ?). *V. antivertigo* seems able to survive floods better than the other species, and indeed while washing the roots I had to be careful, as most of them came to the surface and floated, soon attaching themselves very firmly to some bit of grass or rush. This corner at the bridge is a place where large quantities of debris collect during floods, and may be a haven of rest for this particular species and *Carychium minimum*, while too swampy for *V. pygmæa*. The latter was found to the extent of forty specimens in a mass of

rushes cut off close to the ground and posted to me by the Hon. R. E. Dillon, from drier ground at Clonbrock, East Galway, a few days later. *V. antivertigo*, *V. edentula*, and *Hyalinia nitida* also occurred sparingly, with a dozen or so fine specimens of *Succinea elegans*. That portion of the marsh at Shaw's Bridge which we visited is over an acre in extent, and there must be tens of thousands of *V. antivertigo* in a limited area there. This may help to explain where the great numbers of *V. angustior*, *V. pygmæa*, and *V. pusilla* come from that we find dead in "Pockets" in our northern sandhills in Ulster, especially those which have a good area of marshy ground adjoining, with a variety of food-plants. At Portstewart (especially where the dunes are fringed on one side by the swampy margin of the Bann) thousands of the three species mentioned may be sifted out of a small bagful of shell debris, collected at the proper place. I know three other localities for *V. antivertigo* in Co. Down, at two of these only a few specimens, up to a dozen, are to be obtained in an hour's careful collecting, but at the third, which is on the margin of a flax-dam, I have taken thirty to forty under stones, in company with larger numbers of *V. pygmæa* and *Hyalinia nitida*.—R. WELCH (*Read before the Society*, April 12th, 1899).

Effect of Prolonged Drought on the occurrence of Land Mollusca.—Have any conchologists noticed the effect which was produced on land molluscs by the excessive and protracted heat of August and September, 1898? I was in East Kent for the first fortnight of September and found it most difficult to discover *Helix nemoralis* or *H. aspersa* where I know they abounded. The latter was mainly æstivating in the roots of hedgerow trees. On one of the hottest days I visited a down which usually swarms with *H. virgata* and nearly all its varieties (*l ucozona*, *alba*, *hyalozonata*, *epizona*, and *hypozona*), but hardly one was to be seen except a very few on the trunks of trees. In fact the only shells in this hitherto most productive place were a few *H. cantiana*, and one *H. cartusiana* var. *minor*. *H. virgata* is less affected by the heat than any other shell, and I was puzzled, especially as the down was exactly in the same condition as before, and I had visited it on hot days in the same month in previous years. Seeing nothing to account for a wholesale mortality, I ascribed the barrenness of the land to our tropical weather. But half-a-mile off, on the road to Adisham, I found *H. virgata* in millions on an equally exposed and burnt up field. In one place they so swarmed that a couple of dozen could be taken off any dry stalk about a foot high, and the field looked as if it had an undergrowth of some white-blossomed flower, so thick were the shells and so much did var. *albida* predominate. Walking along the road I noted:—(1) That where *H. virgata* swarmed specimens were uniformly very small. (2) That they were mostly var. *albida* (not *alba*). Excess of numbers had dwarfed the race and deprived it of most of its pigment-producing power. I had not noticed these points (especially the latter) so markedly elsewhere before. (3) Farther along the road the numbers gradually diminished even almost to disappearance, and *pari passu* did the size increase until at last the few found were abnormally large, while nearly all were of the typical form or the var. *subdelta*. One or two other notes may be of interest:—(1) The colony of *Turricula terrestris* is flourishing, but year after year I find hardly any evidence of its extending its territory even by a yard or two. (2) The locality for *H. arbustorum* var. *canigonensis* (the only one I know) yielded some specimens, but it had been made somewhat of a dust-heap to the detriment of molluscan life. (3) The *H. cartusiana* mentioned above contained many eggs. Is not this late in the year? The eggs were also very large for the size of the animal considering that it was very definitely var. *minor*.—J. W. HORSLEY, St. Peter's Rectory, Walworth (*Read before the Society*, April 12th, 1899).

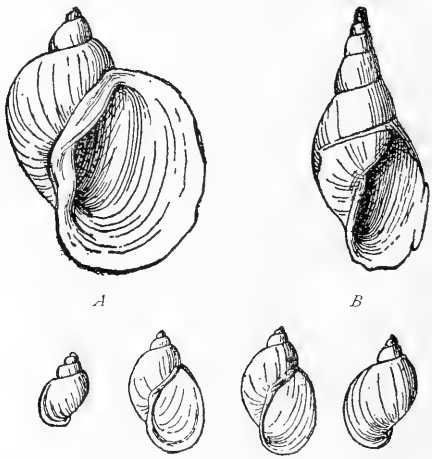
A CROSS BETWEEN LIMNÆA STAGNALIS AND L. AURICULARIA.

By GEORGE W. CHASTER.

(Read before the Society, September 13th, 1899).

On April 2nd, 1898, I received from my friend, Mr. H. E. Craven, two living *Limnææ*—one *L. stagnalis*, the other *L. auricularia*. Two days previously he had taken them near Lichfield in the act of conjugation, *L. stagnalis* performing the part of male, *L. auricularia* that of female. The act was not observed to be reciprocal.

The animals were placed in fresh water and supplied with aquatic plants carefully freed from Mollusca. The *L. stagnalis*, whose shell had been much damaged in transit, only survived a couple of days; but, to my great satisfaction, the other lived and deposited two or three batches of eggs, dying eventually on April 30th. The young



Limnæa auricularia (*A*), and *L. stagnalis* (*B*), with their progeny; magnified two diameters.

emerged from the eggs in about a month's time, and were carefully tended during the summer and autumn. In the winter and spring they were neglected owing to pressure of other work, and but few survived. At the end of June in the present year these had reached adult age, as was evidenced by the slight reflection of the outer lip, and were killed without having been observed to attempt reproduction. Their shells exhibit some variation, but shew no affinity to either parent, for all in their conchological characters are quite unmistakably *L. peregra*!

Now, in connection with this case, two points merit consideration. We are at once confronted with the problem as to whether *L. stag-*

nalis, *L. auricularia*, and *L. peregra* are to be considered as distinct forms, or as mere races or sub-species of a single species. Most conchologists, I doubt not, would positively pronounce them distinct, though some—and those attentive and experienced students of the group—would express a doubt. I do not propose to enter into a long discussion upon the value of various morphological differences as data for separating species, but will merely emphasize the fact that no differences, conchological or malacological, are sufficient to separate two forms as distinct species unless a sufficient number of observations have been made to prove that these differences are constant and that intermediate forms do not occur to bridge over the distinctions. In the case of land and fluviatile Mollusca, with their extremely variable environment, we should expect to find great variation occurring—variation becoming more and more pronounced and permanent until at last races or sub species are produced which no longer revert back to the primitive form when they are re-introduced to earlier conditions of life. (Such races are easily exemplified in *Homo sapiens*). Too often, unfortunately, does the conchologist ignore the scientific aspects of this difficult problem ; too often does he hasten to describe as a 'new species' a specimen presenting some trivial difference from others occurring in neighbouring localities ! Quite recently I noticed six 'new' species of *Succinea* described from the Sandwich Islands alone, some of them apparently based on characters such as specimens from different British localities often present in the case of our *S. putris*.

The remarkable progeny of the *Limnæa* just described appears to afford phylogenetic evidence of considerable importance. Everyone is of course familiar with Charles Darwin's classical observations on the reversion of the offspring of crossed breeds of pigeons to the primitive stock. Have we not here a quite analogous case ? May we not justly conclude that *L. peregra* represents the primitive form from which have arisen *L. stagnalis* and *L. auricularia*, whether these are looked upon as races or as species ? It seems difficult to escape from such a line of reasoning.

Buckinghamshire Mollusca.—On referring to our Journal for conchological records for Bucks., I only find 33 species recorded and I therefore wish to record the occurrence of *Helix virgata*, *H. itala*, *H. cantiana*, *Cyclostoma elegans* and *Clausilia laminata*, all collected by my friend Mr. W. G. Stephenson, of Cheadle, Staffs., this autumn, near Prince's Risborough and Monk's Risborough in Bucks. The specimens of *H. virgata* and *H. cantiana* are both decidedly above the average size. As this county appears to have been somewhat neglected conchologically, I trust some of our members may be able to work up its molluscan fauna.—JOHN R. B. MASEFIELD, Rosehill, Cheadle, Staffordshire, 20th October, 1899 (*Read before the Society*, Nov. 8th, 1899).

ADDITIONS TO "BRITISH CONCHOLOGY."

(Continued from page 232).

By J. T. MARSHALL.

Odostomia (*continued*).

O. conspicua Ald.—9 to 50 fathoms, in shelly and gravelly sand. Scilly Islands 40 f. (Smart and others); S.W. Ireland 54 f. (R.I.A. cruise); Loch Craignish 9 f. (Somerville)! Oban 18—25 f., and Loch Inver 25 f. (Somerville and J.T. M.); Falmouth 19 f.; Lamlash Bay 17 f.; Loch Fyne 20 f.; Glenelg 50 f.; the Minch 45 f.; Pentland Frith 35 f.

This is an exceedingly solid shell, and not variable. It can only be confused, and then in the immature stage, with *O. unidentata*, when it will cause some trouble; but a specimen the size of the latter has the spire more tapering, the whorls not so compact, the apex or embryonic whorls larger and blunter, and the base of the mouth produced. The tooth appears small for the size of the shell viewed externally, but when the outer lip is broken away it is seen to be unusually large and strong. The mouth in the young is not grooved; and in the adult the grooves are fewer and fainter than in *O. conoïdea*. Although widely diffused in Great Britian, it is rare and scarcely ever dredged alive. I have found it less rare in the Scilly Islands than elsewhere, but they are a smaller form, and white. A fine specimen from Guernsey has compressed whorls and a shallow suture; this peculiar variation seems to run more or less through many of the members of this section. Mr. Somerville's Craignish specimen was living, a third of an inch in length, and still immature. The following description of the operculum was taken from it—Having four whorls, with the usual slit for the reception of the tooth (which is large and projecting), the last whorl coarsely wrinkled; length 1-20th of an inch, and small for the size of the aperture. It is very like that of *O. conoïdea*, but the striation and the groove for the tooth are unusually conspicuous.

All the published figures agree in being very good ones. Jeffreys has no dimensions attached to his, but it should be one-third of an inch in length.

O. unidentata Mont.—This may always be known from *O. acuta*, its nearest congener, by the absence of an umbilicus and a squarish mouth. It is not at all variable, and its characters are pretty constant, what variability it has being in the contour of the whorls, prominence of the tooth, and angularity of the base. The apical whorls are not exposed horizontally as in the last species, but only partly so, and partly intorted, as in the next. A single specimen has been found in the Belfast clays (Praeger)!

Var. **elata** Jeffr.—This is simply a slender *fac-simile* of the type, from which it gradually merges. It is usually more sharply keeled, and resembles some specimens of *O. conoidea* var. *australis*. Those from Scilly are almost cylindrical, while others may easily be mistaken for the next, *O. turrita*. It is generally smaller than the type, but a specimen from Guernsey is a quarter of an inch in length.

Jeffreys' figure is perfect, and Forbes and Hanley's (2) are good ones of the type and var. *elata*.

O. turrita Hanl.—A most troublesome species, and bewildering in its many forms, there being every gradation from conical to cylindrical and slender to stout, and they have an affinity with many of the preceding species. Not only is it the most variable of the British *Odostomiæ*, but also the most difficult to determine; I have at least a dozen variations collected from Torbay alone. Nor is it easy to assign to it any permanent or arbitrary character, as all the described ones have their exceptions. It does not always have a keeled periphery, as stated by Jeffreys; the penultimate whorl is not always as large as the last, and it is not always without an umbilicus. It is but one-third the size of *O. unidentata*, which it most nearly resembles, and has the last whorl narrowed instead of expanded, and a small contracted mouth which does not extend beyond the outline of the shell. The range in size is also very great; it sometimes attains a line and a half in length, while some of the dwarf forms, which are equally numerous and variable, do not exceed half a line. Jeffreys' type figure of five-six whorls is more prevalent in the north, where it is dredged; those from the southern coasts live under stones at low-water mark, and are shorter and more conical, with more compressed and fewer whorls (only four besides the nucleus), the last one being two-thirds the length of the shell instead of one-half. Both forms, however, interchange and are often found together. The immature stages of the next species are very much like some of the forms of this one, especially a small cylindrical variety, which is frequent in Torbay and occasionally elsewhere. Monstrosities are numerous, the body-whorl and the aperture appearing unusually liable to distortion. *O. turrita* is a common species, and occurs everywhere and at all depths on our coasts. I have found it most abundant at Falmouth, under stones at low water; these are of a pale bluish white.

Jeffreys' figure of the type is perfect; Forbes and Hanley's (as *O. unidentata* var.) are not good; Sowerby's is a good figure of a common form, but not the typical one.

Var. **striolata** Ald.—Guernsey and Herm; Scilly 40 f.; Land's End; Borough Island and Torbay; Freshwater West; Lismore 10 f.

Dornoch Frith. This stands in the same relation to the type as var. *quadrifasciata* does to *Lacuna divaricata*; it is more dependent on the shape than on the prominence of the tooth or sculpture, the latter characters being as variable as in the type. It is widely diffused, but scarce. Forbes and Hanley figure this as *O. striolata*, but not well; the sculpture is too prominent and the base not sufficiently keeled; but Sowerby's is just the thing.

Var. **nana** Jeffr. (*J. Conch.*, vol. 7, p. 253, 1893).—Scilly 40 f. (Burkill and J. T. M.); Torbay; Cumbrae; Skye; W. Orkneys 45 f.

O. plicata Mont.—Scilly Islands; Margate; Freshwater West; Aberdovey; Isle of Man; Bantry Bay; Mayo and Sligo; Bundoran.

Var. **carinata** Marsh. (*J. Conch.*, vol. 7, p. 253, 1893).—St. Aubin's Bay, Jersey.

This is not a variable species, and no mistake ought to be made about it. It is long, narrow, and tapering, with compressed whorls and shallow sutural lines. The thickened rim round the top of each whorl is rather more pronounced than in the allied forms. The only difficulty of determination is with the immature forms, which may lead astray, and the very young are almost indistinguishable from the same stage of *O. turrita*. It is not perceptibly thinner than that species, the tooth is always visible, and it may be known from any of the slender forms of *O. turrita* by the last whorl being proportionally longer and larger. Specimens with the whorls somewhat rounded, a correspondingly deeper suture, and a shorter spire, from Margate, Torbay, and the West of Ireland, are much like *O. albella* var. *subcylindrica*; but they have a more pointed apex, a stronger tooth, and a proportionally smaller body-whorl and mouth. Another form from the West of Ireland is also more convex, and conical in shape. The largest come from Jersey, attaining a line and a half, and it is most abundant at Fowey and Torbay. A monstrosity with turreted whorls comes from several parts of the South Devon coast.

Jeffreys' figure is not slender enough, and should not be umbilicate; Forbes and Hanley's is too much so, but otherwise very good; and Sowerby's is totally unlike; it has the spire too long and slender, the tooth too prominent, and the mouth too wide and projecting. There is no excuse for these incorrect figures, as it is a comparatively uniform shell.

O. insculpta Mont.—Living in sea-weeds at low spring tides in Torbay, and down to 90 fathoms, on nearly all our coasts.

Var. **lævissima** G. O. Sars (*J. Conch.*, vol. 7, p. 253, 1893).—Guernsey 20 f.; Scilly 40 f.; Torbay 12 f.; Knapdale Lochs 10 f.; Clyde 18 f.; Iona 16 f.; Gairloch 30 f.; the Minch 50-70 f. Also

Dröbak in Christianiafiord, 60-100 f., and several parts of the Mediterranean.

Var. **tumida** Jeffr.—Scilly 40 f.; Borough Island and Torbay; Knapdale Lochs 11 f.; Oban 25 f.; Loch Linnhe 27 f.; Loch Inver 25 f.; Stornoway 9 f. This variety is also sometimes smooth. A form of the type having a shorter spire and a longer body-whorl is found almost everywhere with the type; but this variety, besides having the same proportions, is broader throughout, and of an oval shape. Sars figures this short-spired form as his "forma typica," while our type form he calls var. *nobilis* (pl. ii., f. 11-12).

In Sowerby's figure the mouth is nothing like it should be, and the whorls should be turreted; Jeffreys' is better in outline, but the apex should be obtuse, and the spiral sculpture should not be exhibited throughout the shell, but only on the lower part of each whorl; Forbes and Hanley's has the same faults as Sowerby's. As in the last species, the three principal authors figure three different forms, neither of which fairly represent the shell.

The spiral sculpture of this species is of every degree, being sometimes easily visible to the eye, even inside the aperture, and at other times obscure even with a lens. In some rare cases the spiral lines are limited to one or two only on the periphery, as in *O. nivosa*. The umbilicus does not become fully developed until the shell is mature, and even then is unusually variable. Generally speaking, it is small though distinct, but specimens occur which are without a trace, while in others it is large and open, and approached by a canal formed by the reflection of the inner lip. It is more plentiful at Guernsey than elsewhere, and the largest come from Jersey; I have specimens thence a quarter of an inch in length. A small and slender dwarf form, from Loch Inver and the Sound of Sleat, has the outlines of *O. diaphana*. Monstrosities are very rare; I have only one distorted specimen, and have seen few others.

O. oblongula Marsh. (*J. of Mal.*, vol. 4, p. 38-9, f. 3, 1895)—The Minch 72 f.

Var. **ovata** Marsh. (*Ibid.*)—The Minch 72 f.

O. diaphana Jeffr.—In fine sandy mud, 10 to 90 fathoms. Scilly Islands 40 f. (Burkill and J. T. M.); Loch Inver 25 f.; Loch Boisdale 30 f.; and Sound of Sleat 70-90 f. (Somerville and J. T. M.); S.W. Ireland 5-52 f. (R.I.A. cruise); Jersey, Guernsey and Sark 12-22 f.; Falmouth 19 f.; Cawsand Bay, Plymouth, 12 f.; Salcombe, from stomach of a flounder; Borough Island and Torbay; off Exmouth, Dawlish, and Teignmouth; Bantry, Connemara, and Killala Bay; Eigg Island 20 f.; Iona 16 f.; Clyde 18 f.; the Minch 25-72 f.; off Peterhead 50 f.; West Orkneys 45 f.; Pentland Frith 35 f.; Hascosy

Sound, E. Shetland 10-40 f. Fossil in the Belfast deposit (Praeger)!

Var. **inflata** Marsh. (*J. Conch.*, vol. 7, p. 253, 1893) — The Minch 50-70 f. This is less spindled than the type, and the last whorl is abnormally inflated.

This species is everywhere rare, but less so in the Orkneys and Shetlands. Its clear white and polished surface should always distinguish it from any of its congeners. In outline it is like a miniature of Jeffreys' figure of *Limnæa glabra*, and it is also very like a half-grown *O. warreni*, but is more slender and has not the sculptured base of that species. It has also some general resemblance to *O. rissoïdes* var. *alba*, but is thinner and polished. The Loch Boisdale specimens belong to a dwarf form. An unusually fine specimen from Iona has the periphery finely striated spirally, and one from Scilly has a pronounced umbilicus. Jeffreys' figure is not slender enough; out of a couple of hundred specimens none are so broad. Sowerby's (fig. 23) is *O. insculpta* var. *lævissima*, but his presumed figure of *O. obliqua* (22) is this shell. The dimensions are usually smaller than those given by Jeffreys.

O. warreni Thomps.—Sea-weeds in rock-pools at low spring tides, and dredged dead. Port Erin, Isle of Man (L.M.B.A.)! Killala Bay (Miss Warren)! Berehaven (R.I.A. cruise); E. Sutherlandshire (Baillie and J.T.M.); Channel and Scilly Islands; Helford and St. Mawe's; Torbay and Babbacombe Bay; Tenby, Caldy Island, and Freshwater West; Connemara, Portrush, and Bundoran; the Minch and West Orkneys.

Var. **intermedia** Marsh. (*J. Conch.*, vol. 7, p. 253-4, 1893)—Guernsey; Scilly; Borough Island; Torbay; Killala Bay; the Minch.

Var. **zetlandica** Marsh., n. var.—Conic-oblong, whorls rounder and less turreted, the last one much smaller, being only one-half the shell instead of three-fourths. Shetlands 50-80 f. (Jeffreys); the Minch 65 f. (one specimen).

Gwyn Jeffreys disputed the specific identity of *O. warreni*, uniting it as a variety with *O. obliqua*, until he dredged some specimens in the Shetlands which struck him as too distinct to be left in that position; but while specimens of *O. warreni* from the Minch and Shetlands are like his supplementary figure, in which the spire is longer and the whorls less turreted than in those from the rest of Britain, it is merely a local form, and not suitable for a type shell, while Thompson's original figures in the "Annals" are useless for reference. I know of no figure even approximating to the type of *O. warreni*; but the shell is an exact miniature of *Limnæa stagnalis*, and the dimensions are the same as those of *O. obliqua*, but the shape is very different, and extremely variable. Some extreme specimens will

be found touching closely on *O. insculpta* on the one hand, and *O. obliqua* on the other; but the apex and sculpture are always uniform and distinct. Though usually having an umbilicus at every stage of growth, I have a few examples without that character. A globular form from Torbay corresponds to *O. diaphana* var. *inflata*, while a monstrosity from Jersey has the whorls obtusely carinated, and in another from the West of Ireland the whorls are compressed; otherwise monstrosities are rare. The var. *intermedia* has the last whorl longer, and the whorls are not so turreted; it can easily be mistaken for *O. obliqua* superficially, the proportions and outline being the same; but under a lens the very different apex and sculpture will always distinguish it. It was probably this variety which first led Jeffreys to unite the two species. It will be noticed that the var. *zetlandica* is a deep-water variety. A very minute form comes from Guernsey, Scilly, Torbay, and the Tripoli coast.

O. obliqua Ald.—Fine sand, 12—20 fathoms. Scilly 40 f. (Burkill and J. T. M.); Birterbuy Bay (Dodd)! Sutherlandshire, from fish stomachs (Baillie)! St. Aubin's Bay, Jersey; Tenby; Isle of Man; Connemara; Killala Bay; Durness Point, Sutherlandshire.

This species is always dredged, and rare, but less so at Guernsey than elsewhere. It resembles in miniature Jeffreys' figure of *Limnæa palustris* (which latter is different from Sowerby's), though the sculpture of his figure is too coarse; he makes the spiral striæ as prominent as in the next species (*O. dolioliformis*), but it is not half so distinct, and requires a lens to observe it. Alder's original figure in the "Annals"[1] is perfect in profile, but exhibits no sculpture, although he says "though apparently smooth, specimens when examined with a high magnifier exhibit very minute spiral striæ." Fuller particulars of this and the last species will be found in *J. Conch.*, vol. 7, pp. 253-4, 1893. Jeffreys' descriptions of both are mixed and unreliable.

O. dolioliformis Jeffr.—In sea-weeds of rock-pools at low water. Scilly Islands (Burkill and J. T. M.); Babbacombe Bay (Cox)! Jersey, Guernsey, and Herm; St. Ives and Falmouth; Torbay; Margate; Sutton-on-Sea and Skegness; Southport; Durness Point, Sutherlandshire.

This is the most distinctive shell in the genus, and unlike any other. Nor is it at all variable, except in a slight lengthening or shortening of the spire. It is local and scarce, but not uncommon in some parts of South Devon. It is sculptured spirally with narrow incised lines. Occasionally the periphery is compressed, and this inflects the middle of the outer lip, thus giving the mouth a different outline. My largest, from Guernsey and Lincolnshire, are a line in

1 *Ann Mag. Nat. Hist.*, vol. 13, p. 327, pl. 8, fig. 12, 1844.

length by three-quarters in width. The best figure is that given in "British Mollusca."

The animal is far from sluggish, as stated by Clark. Mr. Stanley Cox has found them crawling freely on the bare wet rocks in Babbacombe Bay, far out of reach of sea-weeds. He also found that in these specimens the animal was of a golden yellow colour, presenting a beautiful object under the microscope, and differing from Clark's description, in which it is described as pale azure. These Babbacombe specimens may probably be exceptional in their habits and food to account for the disparity in colour. All the living specimens I have taken have been from the small sea-weeds of rock-pools.

There can be no reasonable doubt as to Walker's shell being this species, which was said to have been found by him in shellsand from Sandwich; hence Montagu's name *sandvicensis*, and it is in my opinion entitled to priority. Walker's use of the word "reticulatis," and Clark's "quasi-reticulated," are slight errors which any one may fall into on seeing certain specimens which give that impression, owing to the striæ being occasionally wavy or irregular, and these being crossed by the lines of growth. Moreover, no other shell will represent Montagu's *Turbo sandvicensis*.

O. decussata Mont.—Sandy and shelly ground, 10 to 45 fathoms. Scilly Islands (Smart and others); Isle of Man, a single specimen (Archer); Sound of Sleat 40 f., and Loch Boisdale 30 f. (Somerville and J. T. M.); Jersey, Guernsey, and Herm; Connemara, Mayo, Sligo, and Groomsport; Lismore 12 f.; Iona 16 f.; Dornoch Frith; Thurso; the Minch 15—40 f.; W. Orkneys 45 f.; E. Shetlands 10—30 f.

A local species, but rather plentiful in the Scillies and Shetlands. The largest come from Guernsey, and are a line and three-quarters in length, with four sculptured and two smooth whorls, besides the nucleus. Usually there are only three sculptured whorls, but in fine adult specimens there is a fourth. The apex is occasionally raised obliquely, and the umbilicus or chink is unusually variable. A curious incident of this species is that they are nearly all dredged dead, and the majority of them pierced, especially those from the Shetland seas. Jeffreys' figure has the last whorl disproportionate to the length of the spire, which makes it look like an immature shell.

O. clathrata Jeffr.—Birterbuy Bay 12 f. (Dodd)! St. Andrew's (M'Intosh).

This very rare species has the nearest affinity to *O. decussata*, from which it differs in being more slender throughout, with a longer spire, a deeper suture, and coarser sculpture, which is usually continued to the topmost whorls in British specimens. Though described as

having no tooth or fold, that is only so outwardly and in the perfect shell; for when the lip is broken away a small though distinct tooth is readily discernible. Jeffreys' figure is correct in its outlines, but otherwise does not tally with his description. He says the suture is wide and deep and that there is no tooth, characters which his figure repudiates. Forbes and Hanley's figure is a good one, and Sowerby's just the thing. Clark mixed up this species, which he had not seen, with the next. Though a good malacologist, he was a poor conchologist, and from his habit of exalting the former study and depreciating the latter, he made some amusing blunders, not all of which by any means are to be found in his work. An exceedingly small variety, from the Tripoli coast, 120 f., is only $\frac{1}{20}$ inch long by half that width.

O. indistincta Mont.—In fine sandy ground from Guernsey to Shetland, 4 to 72 fathoms (the Minch).

This is a most variable shell as regards size, contour, proportions of the whorls, and suture. The lower whorls are usually more convex than the upper, with a correspondingly deeper suture, and the longitudinal ribs on the last whorl are often finer and more numerous proportionally. Some specimens are very much like the more slender forms of the next species (*O. interstincta*) in shape, and have straighter and coarser longitudinal ribs, but the absence of a tooth will always mark it off from that species. Collectors, however, often experience some difficulty in separating the two species, for reasons given in my account of *O. interstincta*. Shetland produces the coarsest, and Portrush the finest sculptured specimens, there being a marked contrast between the two. It is not found at Jersey, and is scarce in the other Channel Islands, but is not otherwise rare except in a living state. A rare form from the Minch, coarsely sculptured, has the peculiar outline of *O. innovata*, and another form is tubular and compressed. Specimens of the dimensions given by Jeffreys are rare; one from the Minch is one-fifth, and one from Babbacombe is one-fourth of an inch, but these are exceptional. Curiously, enough, the Minch also produces a dwarf form from 53 fathoms, a similar dwarf also occurring in Torbay in 6 fathoms. Although described as "never furnished with a tooth," specimens possessing that character have been recorded by General Stefanis from the Bay of Naples, and by Professor Stossich from the Adriatic. The var. *brevior* has a shorter spire and longer body-whorl, with identical but more delicate sculpture, but it is *not* more convex.

Var. **minima** n. var.—More slender proportionally, and very much smaller; sculpture finer, as in var. *brevior*, and easily worn off in dead specimens. L. 0·07 in.; B. 0·025. Guernsey 18 f.; Torbay 12 f.; Southport; Dornoch Frith. Also Adventure Bank, Mediterranean, 92 f. This has the outlines of a small and slender *O. nivosa*.

I do not know of any good figure of this species. Jeffreys' is correct in outline, but badly executed, as nearly all his sculptured figures are, and his section showing the specific sculpture is erroneous, being exactly like that of *O. interstincta*; Forbes and Hanley's is not good, and Sowerby's is decidedly bad.

O. interstincta Mont.—I must differ from Dr. Jeffreys in saying that "this species cannot be well mistaken for *O. indistincta*." The two species are as "inconveniently similar" as their names, especially when taken in connection with their varieties. Viewed by types only they are good and well-defined species, but their extreme variability makes the identification of intermediate forms a perplexing task, and they are sure to confuse inexperienced collectors. The principal point of difference from *O. indistincta* is in the sculpture, which is coarser, with much fewer cross-bars (these cross-bars appearing at the base of the whorls only), and particularly in the presence of a tooth at all stages of growth. Size and shape are of no account whatever as reliable characters. The minor points of difference (and these not always to be relied upon) are the longitudinal ribs, which are twice as broad as their interstices, whereas in *O. indistincta* they are about equalised; the last whorl is half the length of the shell, in *O. indistincta* one-third, and the interstitial striæ of the latter appears on the lower half of each whorl, giving a somewhat decussated appearance, especially on the body-whorl. As in the last species, the lower whorls are less compact than the upper, and the longitudinal ribs of the body-whorl, both in the type and all the varieties, are frequently finer and more numerous proportionally. The dimensions given by Jeffreys are not correct, nor in accordance with the proportions of his figure, which I consider to be the true type form; the breadth should be 0·06 instead of 0·04 in. This type form is rather plentiful in the Channel and Scilly Islands, but scarce elsewhere in Britain, its place being taken by narrower and varietal forms.

Var. **terebellum** Phil.—Milk-white; whorls 8-9; length 0·175 in., breadth 0·06. Jersey, Guernsey, and Sark; Torbay; Cawsand Bay, Plymouth, a small form with almost straight ribs. This is a very local, handsome, and uniform shell, which will give no trouble to identify. My finest specimens, from Jersey, are a quarter of an inch in length. Its general aspect resembles *O. innovata*, but the interstitial striæ at the base will always identify it. One of my Jersey specimens has straight ribs and an excavated suture, reminding one of Jeffreys' unique *O. formosa*. The locality "Aberdeen," recorded for this variety, on my authority, by Mr. James Simpson,[1] is an error. It is

1 *Ann. Scott. Nat. Hist.*, April, 1896, p. 103.

true he had the specimens from me, but their origin was Jersey. *O. brevicula* Mtros. (*non* Jeffr.) I consider a dwarf and deep-water form of this variety.

Var. **moulinsiana** Fisch. (*J. Conch.*, vol. 7, p. 381, 1893)—The colour of this variety is yellowish-white; length 0·15 in., breadth 0·04. This cannot be confused with any other form, and once seen is easily identified. It has the proportions of *O. fenestrata*, with very coarse sculpture and a prominent tooth.

Var. **suturalis** Phil.—In this variety the last whorl does not project beyond the penultimate one, or is sometimes narrower, with a contracted mouth and a base more or less keeled. Length 0·1 inch, breadth 0·03 inch. The var. *suturalis* of "British Conchology" is the form described and figured by Philippi as var. *gracilis*, which I regard as only another form of his var. *suturalis;* but as a matter of fact the true var. *suturalis* of Philippi does not occur on our coasts. Our form is almost cylindrical, with sculpture of every degree from fine to coarse, common, and generally diffused.

None of the published figures in British works are correct, and no two agree with each other, which is not surprising considering its extreme variability and that each writer takes a different form for his type. Jeffreys' figure is the type form ("conic oblong"); Sowerby's is too narrow and compressed, the tooth too prominent, and the mouth too wide; and both these figures err in depicting spiral striæ throughout the shell, instead of one or two lines only at the base of each whorl; while Forbes and Hanley figure a conical shell, without any interstitial striæ at all. G. O. Sars[1] gives one good figure of the type (t. 22, fig. 14), but a second figure (t. 14, fig. 2) does not represent it.

Gwyn Jeffreys was too hasty in combining various Continental varieties as synonyms of each other, yet at the same time adding another of his own (var. *multicostata*), besides accepting another as a species (*O. jeffreysi*) and adding still another to that species (var. *flexicosta*). They all have the same specific sculpture, it is true, though varying in infinite degrees, and so indicating varieties of one species; but their very distinct outlines and proportions merit varietal names. Some Continental writers go so far as to name all the forms distinct species, which is erring on the other side; and of course in this, as in many others, it is confusing to deal with them in writing, for what British writers are accustomed to regard as individual or sexual differences they consider varieties, varieties they consider species, species as genera, &c. It is promotion all round, or, as one writer has satirically observed, "regiments in which all the members are officers." Of *O. interstincta* Jeffreys has written:—"This abundant

1 Moll. Regionis Arcticæ Norvegiæ.

and widely diffused species is of course extremely variable, and especially with respect to dimensions and number of ribs. Other naturalists must exercise their own judgment as to considering *O. terebellum* or *moulinsiana*, and *O. suturalis* alias *emaciata* or *sylvestri* or *penchinati*, as well as other forms described as species, distinct and not mere varieties. I would not have united them with the typical form if it had not been for the examination and comparison of an immense number of intermediate specimens from different localities."[1] In the type, the variability is that of comparative length to breadth, and degree of sculpture; but in the form designated var. *suturalis* the variations are most perplexing. They have not much affinity with the true *suturalis* (=*striatus*) of Philippi, which is very small, slender, fragile, and cylindrical, with hair-like striæ; but the British form of *suturalis* is a large, broad, and coarse form of var. *gracilis* Phil. and var. *intermixta* Mtros., with a sprinkling of the vars. *gracilenta* and *præcisa*, and some narrow forms of the type, the whole series appearing to be in a state of fusion and impossible to differentiate; that is to say, certain specimens of nearly all these varieties are to be found on the British coasts, but after the examination and allocation of the above forms, a large residue will be found unascribable to either of them or to each other. This species will give more trouble than any other member of the genus, not in making out the species, which may always be known by its specific sculpture, distinct from any other and never varying except in degree, but in separating the many puzzling varieties and forms, than which nothing can be more confusing or hair-splitting. Collectors meeting with any of these forms on our coasts which cannot be assigned to the present named British varieties, will not be far wrong in classifying them under the next very appropriate name—

Var. **intermixta** Mtros.[2] (*nom. subst.*)=*O. jeffreysi* B.D. & D.—This is a frequent shell on our coasts, as well as from a raised beach in Skye (T. Scott)! and differs from the type in being cylindrical, the last whorl equal with the preceding, a smaller mouth, and a keeled base. Compared with var. *suturalis* it is coarser in sculpture and broader throughout. This is the variety specimens of which will be found to approximate to *O. indistincta* in outline, but it is a coarser shell generally. It is figured by Searles Wood from the Crag deposits as *O. pupa* Dubois (a fossil species), with a doubt as to whether it is really the same as Dubois' species; I believe them to be different; while Forbes and Hanley say that Wood's species is *O. excavata*; but that is an error; it is without doubt the form of *O. interstincta* I am now describing.

1 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.*, 1884, p. 353.

2 Nomenclatura Gen. e Sp. Conch. Med. p. 87.

Then, the *O. jeffreysi* of Bucq. D. & D. (cited and approved as a species by Jeffreys,[1] with a suggestion that the name must be changed owing to its being preoccupied) is this same var. *intermixta*; but var. *flexicosta* Jeffr. is much more distinct, and very different from that and every other form in its peculiar shape, being a small, oval, pupæform shell, though having the typical sculpture of *O. interstincta*—the latter character, in my opinion, making it no more, and no less, a species than the others. The difference in its outlines is certainly great, but not more so than in some of the other varieties. I consider it the deep-water form of this polymorphous species, as it has hitherto only been dredged in deep water. It previously had the MS. names of *O. flexuosa* Jeffr. and *O. interrupta* Mtros., but Jeffreys subsequently adopted the former name for another "Porcupine" *Odostomia*, while the latter name must give place to that of *flexicosta*. This form has not been figured, but it has much resemblance to *O. oödes* Watson, from N.E. Australia, and has some affinity with *O. procuerta* Mtros.

O. spiralis Mont.—A common and well-known species, a peculiar variety of which has the longitudinal sculpture obsolete on the last whorl, and rarely on the penultimate as well, in all cases the result of a fresh start in growth after a breakage or rest. A dwarf variety from several districts has a rounder base and more convex whorls. The finest come from the northern coasts of Scotland, and are a line-and-a-half in length.

Var. **coarctata** Marsh. (*J. Conch.* vol. 6, p. 347, 1891).—This resembles some of the cylindrical forms of *O. interstincta*. It is found very sparingly with the type, but is most prevalent at the mouth of the Clyde, and off the Mull of Cantire, in 60 f. All the specimens belong to this variety.

Monst.—Whorls telescoped. This is found occasionally with the type, but more frequently in Torbay, whence I have nearly a score specimens.

O. eximia Jeffr.—The Minch off Loch Boisdale, 72f.; Linga Sound, E. Shetland, 30f. Also 60 miles off the Scillies, 300-600f. (Porcupine)!

This species is minute and rare, and the tooth is of the slightest description. Norwegian and Icelandic specimens are much larger and more conical than British. The figures in "British Mollusca" and Sowerby's "Index" are excellent; but Jeffreys' should be more conical, the whorls more tumid, and the dimensions one-half; the sculpture it is impossible to define.

1 Moll. "Lightning" and Porcupine, *Proc. Zool. Soc.*, 1884, pp. 353-4.

O. fenestrata Forb.—Kilchattan Bay, Bute, one specimen (Robertson), the furthest point north for this species; St. Aubin's Bay, Jersey; Guernsey; Plymouth Sound; Torbay and Babbacombe Bay; Weymouth.

Although a scarce species, this is comparatively plentiful at Plymouth and Torbay. The largest come from Jersey, and are two lines in length by half-a-line in width; some are more slender, and a few are broader than the type. Jeffreys' figure is a good one, but the shell is never so large and conical as depicted by Sowerby or Forbes and Hanley.

O. excavata Phil.—Scilly (Smart and others); Killala Bay (Miss Warren)! all the Channel Islands; Connemara, Mayo, and Sligo; off Loch Ryan, 25 f.; Skelmorlie and Dunoon; Eigg Island, 20 f. Rare in a living state. My finest living specimens (a cluster of three) were found under a stone at low water at Herm, but I think that was exceptional. Jeffreys' figure is a very good one; Sowerby's is not like; our shell has a different mouth, a visible tooth, a deeply-channelled suture, and turreted whorls.

O. scalaris Phil.—Scilly Islands (Smart and others); Sark and Herm; Porthcurnow; Eddystone; Bantry Bay.

Var. **rufescens** F. & H.—Scilly, 40 f. (Smart and J.T.M.); Isle of Man (L.M.B.A.)! Millport, Cumbrae; Davaar Island 21 f.; Otterard Rock 20 f.; Carradale 23 f.; Aird's Bay, 10 f., and Lynn of Morven, 50 f. (Knight)! the Minch off Barra, 40 f., and Sound of Sleat, 40-85 f. (Somerville and J.T.M.); Babbacombe Bay; off N. Little Cumbrae, 40 f.; Lamlash, 15 f.; Kyles of Bute, 18 f.; Loch Linnhe, 26 f.; Clyde, 18 f.; Loch Broom, 20 f.; the Minch, 70 f. Also Atlantic off Scilly, 690 f. ("Porcupine")!

This is a scarce species except at Guernsey and Herm, and very rare in a living state; its true habitat is not known. On one occasion I found a group of eight living specimens, all fully adult, under a stone at low water at Herm, attached to the leathery tube of a sessile annelid. This pecular habitat, like that of a group of the last species, I am unable to account for, but that habitat is not the usual one, as I have never been able to "repeat the dose." Two specimens from Guernsey have the finer and closer longitudinal ribs of var. *rufescens*, but are otherwise typical. The Scilly form of the variety is not the true *rufescens*, but intermediate, and occurs with the type; and off Loch Ryan and in the Minch off Barra the same intermediate form occurs with the var. *rufescens*.

(To be continued.)

OBSERVATIONS ON SOME BRITISH LAND AND FRESHWATER SHELLS.

(The Presidential Address read at the Annual Meeting, Oct. 21st, 1899).

By LIONEL E. ADAMS, B.A.

Considering the able and interesting resumés of different aspects of our science which have in recent years been given by past Presidents of this society I have not thought it needful to attempt anything in this direction, while the complete Annual Report of the Council leaves me nothing to say regarding the Society's affairs: I have therefore ventured to lay before you a few of my own personal observations on some of our less known mollusks, instead of following the usual lines.

In the following notes I have called attention to slight inaccuracies in the works of some of the great conchological authorities, and I trust that by making these corrections I shall not appear to disparage those earlier workers who have made the science of conchology possible.

Cæcilioides acicula Müller. — Having kept several of these obscure little creatures alive for some time, I think a few notes on their form and habits may be interesting.

Food.—In the minute holes and fissures in which this species lives at a depth varying from a few inches to four-and-a-half feet, it is difficult to say what it finds to eat. Jeffreys supposed it to live upon animal matter, alleging as a reason that "in the spots where it has been found living, no underground fungus or other vegetation appears to exist, and the form of the shell would induce a belief that this snail is not only zoophagous but predaceous. The shells of all true Glandina, which are carnivorous, have the same kind of notch or truncature at the base as the present species of Achatina." Now, in the Northants locality there *is* a certain amount of vegetation for them to feed on—in fact many of the fissures are made by long fibrous roots which penetrate often to a depth of three feet. Often, too, the shells are found in worm-holes which extend to a like depth, but whether they feed on the roots or upon decayed worms, beetles, etc., I am unable to say. I offered my captives a variety of food, and on one occasion I distinctly saw one browsing on the surface of a young cabbage leaf; they were fond of crawling among damp moss, but I could not see whether they fed upon it. I also provided them with raw beef, worms living and dead, and leg of mouse, and placed them round the meat, but they would always crawl away into the moss. Nilsson has no doubt that they feed on the "tendrils and sap of the roots of grasses," and I fancy he is correct. It is possible, but I think it hardly probable, that they habitually come to the surface and feed at night.

Methods of Progression.—Usually the shell is dragged along the ground after the animal, though more rarely it is lifted to a horizontal position (fig. 1A). On two occasions I observed the animal protrude its head under the shell towards the spire and progress in that direction, forcing the shell along the ground in front of it, apex first, and then lift the shell over its head at an angle of about 45 degrees and continue its march in that position (fig. 1B). The progression is always by slow jerks, and not a continuous glide. I have not observed the shell carried in the position of Jeffreys' figure (B.C., vol. i., pl. vii., fig. 18), though Nilsson says "the animal sometimes carries its shell erect, but generally drags it along depressed."

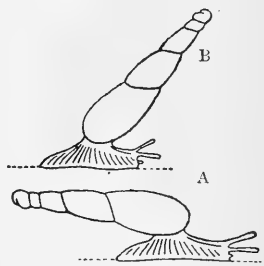


FIG. 1. *Cæcilioides acicula.*

Texture and Form of the Animal.—I was much struck with the extremely flexible and elastic nature of the animal. I have observed one emerge from the shell as it lay flat on a horizontal surface, and make a complete circle with its head and tail, without moving the shell. It is also remarkable how far the animal will protrude from the shell, and how slender an attachment connects the head and foot with the part within the shell. The end of the tail is often curled up. Along the neck and down the front of the head are two mucus sulcations on either side of the dorsal line (fig. 2B). The tail is pointed and sharply carinated; from the dorsal ridge mucus sulcations descend to the lower edge (fig. 2A).

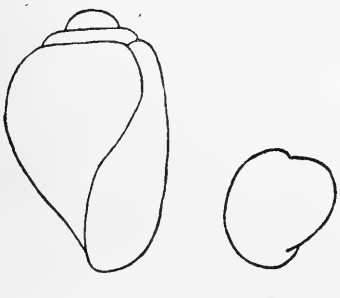
FIG. 2. *Cæcilioides acicula*, showing mucus grooves on head and tail.

Eyes and Tentacles.—Jeffreys' enlarged figure (B.C., vol. i., pl. vii,, fig. 19) is not quite accurate. He seems to have taken his description from Nilsson, and it may be doubted whether Jeffreys himself examined the animal with sufficient care. Nilsson had evidently studied the animal, but he was not correct in describing the upper tentacles as "not thickened." In all the specimens that I have observed the upper tentacles are certainly slightly bulbous when fully or nearly fully extended, though this does not appear when they are only slightly protruded. Nilsson, however, correctly remarks that the apices of the upper tentacles are not 'marked with a black spot.' Now Lamarck (to whom Nilsson refers) seems to have been the only one to observe the colourless eyeballs, and he did not recognise them as such. Nilsson says (quoting Lamarck)[1]: "In this species no eyes

1 Hist. Moll. Svec. Terr. et Fluv., p. 39.

indeed are exposed, unless they are white, like the tentacles themselves. These, indeed, are terminated by a convex surface, very smooth, very shiny, surrounded by a slightly-impressed ring; which surface doubtless answers to the *eye* of other terrestrial molluscs. But this animal, probably because it lives underground, where it cannot use eyes, appears to us plainly to lack eyes." Now I have noticed that these peculiar convex endings with a constricting ring are in fact eyeballs, and also that they are retractile, but whether they have retained the power of sight in spite of their loss of pigment, I am not prepared to say (see fig. 2B). As far as my observation goes, the animal is insensible to light, though it will crawl straight away to a heap of moss; the direction, however, may be determined by scent alone. If it is deficient in sight it certainly uses its tentacles to all appearance in the same manner as its more favoured brethren. I may mention in this connection that an albino specimen of *Limax maximus*, whose eyeballs were also destitute of pigment, seemed to act in a perfectly normal manner. Though my observations on this point (*J. Conch.*, vol. 9, p. 24) tend to shew that this species is lacking in sight, I am not aware to what degree of perfection the vision of terrestrial mollusks attains, but I have noticed that *Cyclostoma elegans* and *Helix pomatia* seem sensitive to the approach of a large object.

LIMNÆA BURNETTI Alder and L. INVOLUTA Thompson.—There has always been much doubt as to whether *L. burnetti* and *L. involuta* are worthy of specific rank, or whether they are by-forms of *L. peregra*, and so far the authorities have been in favour of according specific rank to *L. involuta*, and withholding it from *L. burnetti*.



A B

FIG. 3. Young shells of *Limnæa*.
A. *L. involuta*.
B. *L. burnetti*.

A year ago (September 10th, 1898) my friend Mr. A. G. Stubbs and I paid a visit to *L. involuta* in its native tarn, and had the opportunity of observing the animal in its very young stage. The little creature, less than two mm. in altitude, showed a decided spire (fig. 3A) exactly like that of a young *L. peregra*, but individuals very slightly more grown showed the whorls grown up beyond the spire which was sunk below the ridge of the whorls. Now, a very interesting photograph, taken by Mr. J. Madison, of *L. burnetti* one day old and not quite a millimetre in altitude, shews the spire clearly intorted—more so indeed than is the case with the adult shell (fig. 3B).

So far, then, as the shell alone is specifically diagnostic, *L. burnetti* is more worthy of separation than *L. involuta*.

Jeffreys,[1] speaking of *L. involuta*, says: "It has some affinity to *L. glutinosa*, and may ultimately prove to be an aberrant form of that species, corresponding with the variety *burnetti* of *L. peregra*. Very little is known with respect to the external parts of the body; but Professor Goodsir has given some valuable details of its internal organisation. He says: "In structure the *Limnæus involutus* resembles the other species of the genus," from which remark it might be inferred that the mantle has not the expanded lobe which is peculiar to the sub-genus *Amphipeplea*. Dr. Perceval Wright, however, informs me that "the greater part of the shell in this species is covered by the mantle, as in *L. glutinosa*."

Mr. Stubbs and myself kept our captive specimens alive for a couple of days, and watched them carefully, but we did not see a trace of overlapping mantle; and Mr. J. W. Taylor says: "I have had *L. involuta* in confinement for some little time, and the mantle never overspread the shell, though under close observation." I can only conclude that Dr. Wright's information was incorrect.

It was surprising to find so late as September 10th that none of the examples were more than half grown, most being only a quarter of their full size, seing that at this time of year *L. peregra* has usually attained maturity. But what seemed more surprising was the quantity of fresh-laid egg-masses attached to stones. *L. peregra* is about the earliest breeder of the genus, commencing to pair with the first encouragement of warm spring days, nor does it pair after August—rarely after July; and though Moquin-Tandon says: "Garnier observed an isolated individual in a glass vase lay twenty-six times from the 1st July to September 24th," this was under artificial conditions. But whether *L. involuta* habitually postpones pairing till the autumn I cannot say. In July, 1898, Messrs. Collier and Chaster visited Loch Crincaum, but they did not find any egg-masses. I do not think the altitude of the habitat (798 feet) can have anything to do with the matter when the very mild climate of south-west Ireland is considered, especially since at considerable elevations close by Killarney *L. peregra* was found normally forward.

Mr. Madison informs me that "*L. burnetti* was pairing in Loch Skene on April 4th, 1896, and began to deposit spawn during the first week in May." The shape of the egg-masses of *L. involuta* was invariably spherical and not sausage-shaped, as are those of *L. peregra*. Mr. Madison says "I do not think there is any difference in the eggs of *L. burnetti* and *L. peregra*."

1 Brit. Conch., vol. 1, p. 103.

GEOMALACUS MACULOSUS Allman.—I have noticed with much interest that the light spots which besprinkle this slug are not scattered indiscriminately, but are in all cases less numerous in the regions of the lateral and dorsal bands which exist in other slugs. This is much more noticeable in juvenile specimens than in adults—the smaller the individual the clearer the bands. This species has the habit of curling up into a perfect sphere when irritated, after the manner of a woodlouse (see fig. 4).

FIG. 4. *Geomalacus maculosus*, rolled up.

I would call attention here to the Irish slugs as a whole. They are much more variable in colour than those met with in Great Britain. This is especially the case with *Limax marginatus* Müller (= *L. arbustorum* B. Ch.), *Limax maximus* L., and *Arion ater* L. In Ireland the very young of *A. ater* (especially the form *brunnea*) are commonly banded, whereas in Great Britain this is very exceptional except in South Wales. Certain strikingly coloured forms are common in Ireland which are exceedingly rare here, though in South and Mid Wales I have come across them in large colonies. The same remark applies to *L. maximus*, though to a less extent. On the whole the greatest number of varietal forms is found in the S.W. of the British Isles, and the fewest towards the N.E. And this is exactly what we should expect if we accept the theory of a Lusitanian origin of our slugs which has been so ably set forth by Dr. R. F. Scharff in his "European Fauna."

CARYCHIUM MINIMUM Müller.—Jeffreys' description of this animal does not quite correspond with my observations, and his figure (the only one, so far as I am aware, in any British work) is decidedly faulty. He describes the ends of the tentacles as 'rounded,' and he figures them with rounded bulbs. In all the many specimens I have examined

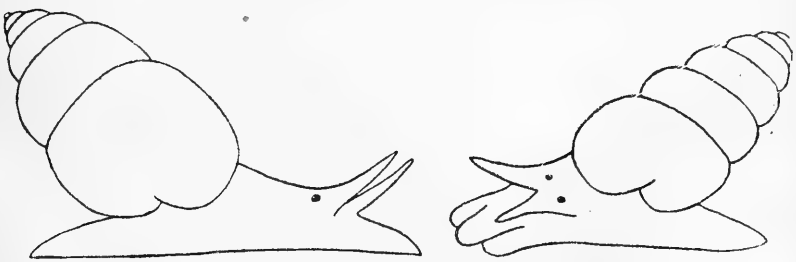


FIG. 5. Two views of *Carychium minimum*.

the tentacles are simply conical, and Moquin-Tandon's figure exactly corresponds with my drawings in this respect. The position of the conspicuous sessile eyes is close behind the bases of the tentacles, and

not between them, as figured by Jeffreys; and moreover, they consist of simple black spots with no surrounding ring (see fig. 5). I once took an individual in North Ireland which had no right eye, though normal in other respects. I have never been able to perceive the "black and white speckles" which Jeffreys speaks of as occurring on the footsole.

WHITE FORMS OF PUPA CYLINDRACEA Da Costa, P. ANGLICA Férussac, P. MUSCORUM L, ACICULA LINEATA Draparnaud.—It is commonly supposed that the white varieties of mollusks are albinos, which is far from being always the case. As Mr. K. H. Jones points out in his article on Albinism,[1] individuals with any particle of pigment even in the eye alone, though possessing perfectly white shells, are not true albinos. An extensive examination of the white forms of the above species shows that not one of them is a true albino, indeed all the white *Pupæ* have nearly as much body colour as their types.

FIG. 6. *Acicula lineata*, showing the pigment spots through the shell.

Acicula lineata, however, is perfectly colourless and transparent like *C. acicula*, but the rows of pigment dots which constitute its sessile eyes show that it is no more a true albino than *C. minimum*. These eye-dots can be seen quite plainly through the shells of both the type and the var. *alba* (see fig. 6).

True albinism in our British non-marine shells is extremely rare, the only constant specific instance being *C. acicula*. The only instances of varietal albinism that have come under my notice are a single specimen of *Limax maximus* L., and two specimens of *Agriolimax agrestis* L.

It is easy to understand how an animal though possessed of body colour, should fail to secrete colouring matter for the shell, but it is not so easy to understand how an animal perfectly colourless itself should possess a normally coloured shell. An example of this anomaly occurred a few years ago in an adult *Helix aspersa* which I found at Dover. The animal was perfectly white, even the eyes being colourless, while the shell was slightly darker than usual.

1 *J. Conch.*, vol. 8, p. 3.

Helix marmorata var. **alba** nov.—This form of *Helix marmorata* has not previously, so far as I can ascertain, been described. The shell is white with translucent markings. Although this species exists in countless thousands at Gibraltar where my albino specimen was taken in November, 1898, it is the only example of this variety revealed during many weeks of careful research.—K. HURLSTONE JONES (*Read before the Society*, March 14th, 1900).

A REVISION OF THE TEXTILE CONES, WITH DESCRIPTION OF C. CHOLMONDELEYI, N. SP.

By JAMES COSMO MELVILL, M.A., F.L.S.

(Read before the Society, December 13th, 1899).

It is now nearly fifteen years ago since I essayed a tentative grouping and revision[1] of that somewhat isolated and peculiar section of *Conus*, called *Cylinder* by Denis de Montfort, 1810; *Textilia* by Swainson, 1840; and exactly corresponding to the seventeenth section *Texti* of the genus, proposed by Weinkauff.

This paper being now out of print, and several modifications and alterations being considered essential, I deem no apology necessary for again traversing the subject, albeit the whole matter lies at first sight in so small a compass. For indeed, since 1885, no new form of Textile Cone has been described until now, *C. cholmondeleyi* sp. nov. being figured in this article.

So recently as a fortnight ago Mr. Robert Standen and I described a new Textile Cone,[2] allied in form to *C. gloria maris* Chem., and in disposition of marking to *C. episcopus* Hwass, or *C. aulicus* L. It is a fine new form dredged at 45 fathoms by Mr. F. W. Townsend, during the repairing of the Eastern Telegraph Co.'s submarine cable, about 125 miles W.S.W. of Bombay. But I am inclined now to place this beautiful species (*C. clytospira* M. & S.) in the section *Leptoconus*, as allied perhaps most nearly to *C. acuminatus* Brug. It is noteworthy that Paetel places this last in the Textile group. Indeed the disposition of marking in several of this section is very similar to the true *Cylindri*, but the channelled upper whorls, light build, and very deep sutural excavation of the last whorl, all which distinctive features are present in *C. clytospira*, prompt me to change an opinion which was at first based on the reticulate pattern and form alone. *C. amadis* Chem. may be taken as a good type of the *Leptoconi*; its light substance, deep sutural excavation, channelled upper whorls, are all typical, and I fancy the general verdict will be that the *C. clytospira* is best placed here, although in form there is much similarity between it and *C. gloria maris* Chem.

To revert to the *Textilia* proper; forty-five forms (species or varieties) are here enumerated, and of these all, excepting four, are

1 *Mem. and Proc. Manchester Soc.* (3), vol. 10, p. 49, 1885 (1887).

2 *Ann. and Mag. Nat. Hist.* (7), vol. 4, pp. 461-463, 1899.

exhibited to the Society to illustrate these remarks—the four absentees being *C. dalli* Stearns, *C. convolutus* Sowb., *C. prevosti* Sowb., and *C. telatus* Reeve. The last three of these are in our National Collection, *C. dalli* being therefore the only form I have not been able personally to examine.

The border line between specific, sub-specific, and varietal forms must necessarily be somewhat hazily defined, and may be considered in certain cases somewhat arbitrary, but a long study of the several forms convinces me :—

Firstly.—That there is a finality in the variability.

Secondly.—That the majority of the forms are, when once learnt, comprehended without very severe difficulty, though, doubtless, intermediates do occur, especially amongst the *Textilia Vera* and *Abbates.*

Thirdly.—That of the five characteristic and salient points, viz., *form*, *colour*, *size*, *texture*, and *disposition of marking*, the variation in one of these particulars alone does not count for much—one needs a combination of two or three of them at least to produce a deviation from the type sufficient to justify the creation of a species.

But few of this group were known to or, at all events, differentiated by Linnæus, *C. textile*, the 'field of the cloth of gold' of old authors, and *C. aulicus*, being the only two on which he imposed specific names. The majority of the others have been described by Hwass, Kiener, Mawe, Menke, the Sowerbys, and Reeve.

* * * * * * * *

The sub-genus *Cylinder* Montfort, 1810, may be thus briefly characterised :—

Shell subconic, smooth, or very lightly striated, often somewhat solid, spire more or less elevated, whorls never coronated, mostly numerous; body whorl nearly always ventricose, excavate mostly at the suture, aperture effuse, but rarely narrowed ; coloration white, with a more or less complicated orange, brown, or grey reticulation, producing a great variety of patterns in the several forms and species.

Feeling it unnecessary to recapitulate the prefatory matter given in my former paper, referred to above, as to geographical distribution, affinities, etc., of *Cylinder*, and brief particulars as to the anatomy of the genus *Conus*, I venture to propose the following arrangement of the species and varietal forms of this section. It is a slight modification only of that originally given, but tending, I believe, to a more natural concatenation :—

CONUS L.

Subgenus *CYLINDER* Montfort.

I. Lucidi. | II. Retiferi.

C. lucidus Mawe. | *C. retifer* Menke.

III. Textilia.

(*a*) Vera.

C. textile L.

1 *tigrinus* Sowb.
2 *vicarius* Lamk.
3 *verriculum* Reeve.
4 *concatenatus* Kien.
5 *scriptus* Sowb.
6 *canonicus* Hwass.
7 *condensus* Sowb.
8 *dalli* Stearns.

(*b*) Abbates.

C. abbas Brug.
C. panniculus Lam.
1 *textilinus* Kien.
C. corbula Sowb.
1 *euetrios* Sowb.
C. archiepiscopus Hwass.
C. victoriæ Reeve.
1 *complanatus* Sowb.
C. cholmondeleyi Melv.
C. prevosti Sowb.

(*c*) Pyramidalia.

C. pyramidalis Lam.
1 *convolutus* Sowb.
C. gloria maris Chem.
C. legatus Lam.
C. paulucciæ Sowb.
C. telatus Reeve.

IV. Aulici.

(*a*) Episcopi.

C. episcopus Hwass.
C. omaria Hwass.
1 *pennaceus* Born.
2 *rubiginosus* Hwass.
3 *magoides* Melv.
4 *marmoricolor* Melv.
5 *madagascariensis* Sowb.
C. prælatus Hwass.
C. elisæ Reeve.
C. aulicus L.
1 *propenudus* Melv.
C. auratus Lam.
C. magnificus Reeve.

(*b*) Crocati.

C. colubrinus Lam. | *C. crocatus* Lam.

C. racemosus Sowb.

V. Aurei.

C. aureus Hwass. | *C. clavus* L.

* * * * * * * *

I. Lucidi.

C. lucidus Mawe (= *reticulatus* Sowb.).—The only species of the section. Form squarely conical, encircled with spiral chestnut lineations, joined longitudinally in an irregularly areolate or lateritious manner, and here and there blotched with chestnut suffusion. Interior of the aperture purplish. Long. 44mm.; lat. 51 mm. *Hab.*: Isle of La Plata, Central America.

II. RETIFERI.

C. retifer Menke (= *solidus* Sowb.).—Amply characterised by its pyriform outline, spiral striation, great solidity, and coarse wide-spread reticulation. *Hab.* Philippines and other eastern islands.

III. TEXTILIA.

(*a*) Vera.

C. textile L. and eight varieties.—The type may be characterised thus :—Shell white, banded twice or thrice spirally with interrupted yellow-brown or chestnut blotches, longitudinally lineated with zigzag or undulating blackish-brown pencillings, nearly enclosing triangular or crescent-shaped white spaces of larger and smaller dimensions.

The forms and limitations of this very widely-spread and common eastern species are difficult to define; certain, still undescribed, are evident when a series of what is still called typical *C. textile* is examined, but many of these undoubtedly run into each other. However, the following seem fairly distinct and recognizable when once learnt, with the exception perhaps of the aptly-named *C. concatenatus* Kiener :—

1. *tigrinus* Sowb.—To a great extent destitute of the brown bands, the pattern, therefore, seeming less involved.
2. *vicarius* Lam.—Form more pyramidal, pattern coarser and larger in detail, with greater preponderance of the white triangular patches.
3. *verriculum* Reeve.—Shorter and thicker than the other varieties, markings as in *vicarius*, but with a greater amount of yellow blotching.
4. *concatenatus* Kien.—Hardly distinguishable from *vicarius*, in my examples, exhibiting a much more open reticulated net-work, with the orange blotches smaller in proportion. It can scarcely be doubted, however, that intermediate forms occur, and I do not consider it a very satisfactory variety.
5. *scriptus* Sowb.—A beautiful species, closely reticulated with pale-brown lines. The finest example I have seen of this was shown me some years ago by Mr. F. P. Marrat, and was about 63 mm. in length ; it is undoubtedly nearly akin to the next form.
6. *canonicus* Hwass.—Differing in its mostly darker reticulations, with but little orange blotching, the form being conically pyramidal, rather solid ; in some examples a pale-pink suffusion overspreads the whole surface. My largest specimen is 78 mm. long.
7. *condensus* Sowb.—Pink tinge always constant ; a dwarf form, with pale markings, as in *scriptus*.
8. *dalli* Stearns.—Of lighter build ; spire convex, mouth roseate. From California. I have never seen this species.

Tryon says: "Closely allied to *C. textile*, but the spire has a convex outline"; "bodywhorl obscurely spirally ribbed below; yellowish-brown, with reddish-brown longitudinal stripes, interrupted by four revolving bands of white spots, and occasional white spots on the darker surface."[1]

(*b*) Abbates.

The texture and markings fine, form pyramidal, spire as a rule more depressed than in the first group.

C. abbas Brug.—Very beautifully and intricately marked with smaller reticulations; a remarkably constant form, though variable in size. My largest specimen is 63 mm. in length, smallest 25 mm. It is not an uncommon Philippine species.

C. panniculus Lam.—Slightly more ventricose than *C. abbas*, of which many authors consider it a variety. The markings are, however, darker, and cover the surface more uniformly, almost obliterating the spiral ochreous or chestnut bands. From the Sandwich Isles and Philippines.

1. *textilinus* Kien.—Conically pyramidal, but otherwise as in *C. panniculus*. The original type of Kiener's, which I possess, shews the markings more chestnut-coloured and brown.

C. corbula Sowb.—Of particularly effuse growth, ventricose, very closely longitudinally lineated, the lines interwoven.

1. *euetrios* Sowb.—Slightly more roundly tapering than the last, to which it closely approaches. Markings even, more interwoven and regular, lowest whorl twice banded with purplish tinge of reticulations. The type of this is unique in my collection. Locality unknown.

C. archiepiscopus Hwass.—Somewhat curt, solid, with longitudinal lines, most closely and beautifully interwoven, the spaces forming almost circular small white contiguous spaces. A particularly richly ornamented species; it cannot be denied that intermediates exist between this and *C. panniculus*, the form, however, is not nearly so ventricose. A rare inhabitant of the eastern archipelago.

C. victoriæ Reeve.—Very distinct, being of light growth when compared with any of its congeners; the three spiral bands on the last whorl are ochreous, inlaid with much blackish or cinereous suffusion; the network is peculiarly thin and delicate.

1. *complanatus* Sowb.—A colour variety only, with much lighter bands and less fine reticulations. Both this species and its variety are from Australia, and are extra-tropical.

1 Man. Conch., *Conus*, vol. 6, p. 91, 1884.

C. cholmondeleyi sp. n.—*C. testa oblongo-cylindrica, attenuata, solida, perlævi, pallidé fuscescente; anfractibus 7, quorum duo apicales fuscocarnei, læves, immaculati, cæteris delicatissimé et intricaté longitudinaliter brunneo-lineatis et reticulatis, simul ac castaneo et brunneo pulchré suffusis; ultimo anfractu feré recto, nequaquam ventricoso; apertura angusta, apud basim latiore, intus cærulescente; labro recto, apud basim paullulum producto, ad suturam leniter excavato.*

Long. 45, *lat.* 12 *mm. Hab.* ?

Conus cholmondeleyi.

A peculiarly distinct form, in marking resembling *C. corbula* or *C. euetrios*, while in its narrow cylindrical shape it has no near ally, excepting perhaps *C. legatus* Lam., from which, however, it is in every other way abundantly distinct. It has till now been confused with *C. pyramidalis* Lam., but the elevated spire of this latter would alone differentiate it. Unique in the Manchester Museum, formerly in the possession of the late Reginald Cholmondeley, Esq., of Condover Hall, Salop, to whose memory I would dedicate it. I must thank Mr. Edgar A. Smith for kindly comparing this shell with the 'Textile' series in the British Museum (Nat. Hist.), and giving me his opinion thereupon.

C. prevosti Sowb.—Shell somewhat constricted, furrowed below, bright chestnut, obscurely banded with darker brown, on a white ground, very finely reticulate. Length 40 mm. From New Caledonia.

There are two examples of this distinct and rare species in our National Collection, South Kensington. The type was formerly in that of M. Prevost, of Alençon, who possessed an especially fine series of Cones. I cannot connect it very closely with any other form.

(*c*) PYRAMIDALIA.

C. pyramidalis Lam.—A species with simple reticulated network, and usually no ochreous blotching. Its lengthened form and smooth elevated spire distinguish it.

1. *convolutus* Sowb.—Slightly more conical, and of lighter colouring. In the National Collection it is considered a variety of *C. pennaceus* Born. This I have seen in the British Museum Collection, but do not consider it a very satisfactory form. Reported from Madagascar.

C. gloria maris Chem.—Upon this renowned shell, as rare as it is beautiful, I expatiated fully in my former paper already alluded to. A fine specimen measures between 12 and 15 cm. in length, the last

whorl tapers very gradually, spire twelve to fourteen whorled, smoothly gradate, reticulations exceedingly fine, regular, and minute; orange blotching somewhat modified. From Jacna Island, Philippines; not found since 1837. Only twelve to fourteen examples occur in collections.

C. legatus Lam. — Compressedly conical with spire somewhat elevated. Of moderate size only, peculiar in its coloration, being suffused with pink, and with the longitudinal chocolate maculations very prominently shown. From Ceylon, Mauritius, and Polynesia.

C. paulucciæ Sowb.—Allied on the one hand to *C. aureus*, and on the other to *C. gloria maris*; of very straight pyramidal growth, very richly and handsomely marked with warm chestnut and orange. For further remarks about this uncommon form I refer to my previous paper. From Mauritius.

C. telatus Reeve.—Very conical, much like *C.* (*Leptoconus*) *ammiralis* L. in form, and in marking approaching *C. architalassus* Dillwyn, which is a doubtful species, pronounced by most authors a mere form of the beautiful and protean *C. ammiralis*. Notwithstanding these attributes, I maintain it is more naturally placed here, though arranged in our National Collection amongst the *Leptoconi*; the marking after all is that of a Textile Cone, if analysed well.

[*C. clytospira* Melv. & Stand., already referred to in this paper, may still by some conchologists, who prefer to group certain *Leptoconi* with the *Cylindri*, be elected to fill a place in this subdivision].

IV. Aulici.

Shells as a rule narrow in proportion to their length, spire rounded emerging into the body-whorl, elevated, marking on most of the species very bold and distinct dark chestnut or chocolate-brown blotches, alternating with lines of somewhat triangular large white spots interlined with smaller and boldly reticulated.

(*a*) Episcopi.

C. episcopus Hwass.—As said above, in marking much allied to *C. clytospira*. Body-whorl shouldered above, ponderous, spire blunt, few whorled, running in some of its varieties close to the next species.

C. omaria Hwass.—The type presents an oblong slightly ventricose shell, with simple brown reticulations on white ground, but the chief varieties are :—

1. *pennaceus* Born.—A shouldered, ponderous variety, more conical in shape, often with pinkish tinge, and blotched and reticulated in more uniform fashion.
2. *rubiginosus* Hwass.—Like *pennaceus* in form, but in marking like typical *C. omaria*.

3. *magoides* Melv.—Slightly flexuous in form, much like *C. magus* L., pinkish, with pink-brown blotching, suffusing most of the surface.
4. *marmoricolor* Melv.—A not uncommon form, in which the colour is black or dark-brown, and the white spaces arranged much as in *C. marmoreus* L. or *C. nocturnus* L.; spire, however, never coronated.
5. *madagascariensis* Sowb.—Conical, very finely reticulated. I hardly think this is a true species, though described as such by its author.

C. prælatus Hwass.—Always suffused and clouded with grey, but distinct, I think, from all forms of *C. omaria*.

C. elisæ Kien.—Very closely reticulated with chocolate-brown, so as to appear like a uniform brown surface with innumerable white specks. Near *C. racemosus* Sowb. of the section Crocati. From Madagascar.

C. aulicus L.—The largest and boldest-marked species of the genus, sometimes attaining a length of 15 to 17 cm. It is distinguished by its roundly oblong form, and spiral revolving striæ; marking very bold, with scarce reticulations enclosing triangular spaces. Colour deep chestnut-brown.

1. *propenudus* Melv.—The marking becomes more scanty, leaving a large tract of surface bare and white.

C. auratus Lam.—Very near the last, but constant in somewhat greater compression of whorl, and difference of pattern, the reticulations being all much smaller and dispersed in a zigzag manner.

C. magnificus Reeve.—A very fine species, very constant in elongate form, with somewhat conical, exceedingly obtuse spire and apex, marked as in the body of the shell with extremely small irregular reticulation; the colour is pinkish, suffused with dark chestnut-brown. From Luzon Island, Philippines.

(*b*) Crocati.

C. colubrinus Lam.—Yellow, with oblong white spots, or simple reticulations. From Mauritius.

C. crocatus Lam. — A very handsome orange-yellow conical species, with white spots and markings, very few and far between, and broader than long. Some examples are almost uniform yellow. This species at first sight has almost less similitude to a Textile Cone than any other. Native of Ceylon.

C. racemosus Sowb. — Shell brownish-orange, solid, smooth; spire convex, with obscure reticulated brown and white marking lines, and clusters of triangular white spots sparingly agglomerated. Unique in my collection. Dredged in the Sandwich Islands.

V. Aurei.

Shells sub-cylindrical, merging into the next sub-genus *Hermes*, ribbed spirally, spire elevated, very obtuse, convex.

C. aureus Hwass.—Much like *C. pauluccie* Sowb. in marking, but not of such conical, regular shape, and spirally ribbed, not smooth. Not infrequent in the Moluccas and Philippines.

C. clavus L.—A very beautiful and delicate species, marked with orange and brown reticulations on a white ground. Very elongate, with rounded obtuse spire which is often spotted. By some authors this is considered a *Hermes*, near *C. nussatella* L., which it much resembles in form, but in marking it is eminently a Textile Cone. It is of wide distribution in the eastern tropics, from Java to New Caledonia, and also Polynesia.

It will thus be seen that, in the new arrangement proposed, the principal changes proposed from the first list are as follows :—

(*a*). The sections *Lucidi* and *Retiferi*, preceding (not following) the *Textilia*.

(*b*). Among the *Textilia*, *C. corbula* Sowb. and *C. euetrios* Sowb., the latter now treated as a variety only, are removed from the *Vera* to a place among the *Abbates*, where also the new species, *C. cholmondeleyi* Melv. is for the present lodged.

(*c*). The sequence in the section *Pyramidalia* is altered, while the species remain the same.

(*d*). In the section *Aulici*, the group *Episcopi* precedes *Crocati*, the sequence in this section being likewise altered. A colour variety *propenudus* is proposed of *C. aulicus*, *C. auratus* Hwass being still, though with some hesitation, kept distinct specifically, while *C. madagascariensis* Sowb. is considered but a variety of *C. omaria* Hwass.

* * * * * * *

I may just add that in our National Collection the two nearly allied species *C. neptunus* Reeve and *C. neptunoides* E. A. Sm. are arranged between *C. gloria maris* Ch. and *C. telatus* Reeve, this latter being, as already said, in close proximity to *C. ammiralis* L. and other *Leptoconi*. *C. neptunus* has a certain reticulate pattern, somewhat resembling the Textile Cones, but I think it more likely to belong to the section *Rhizoconus* or *Chelyconus* Mörch. Paetel, however, classes both *C. neptunus* and *C. neptunoides* as *Cylindri*. It may be, indeed, that there is a closer connection between these species and *C. prevosti* Sowb. than is at present suspected, and I would invite students of the genus to essay a closer analysis of the various groups of the genus as now constituted, with a view to a future critical monograph of the five to six hundred species of *Conus* already described, when I prophesy it will be found that certain of the *Leptoconi*, and even of the *Marmorei*, have more than a superficial affinity with the *Cylindri*.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

286th Meeting, January 10th, 1900.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted:
The usual periodicals received in exchange.

New Members Elected.

Dr. G. H. Broadbent, 8, Ardwick Green, Manchester.
Mr. Hugh Watson, Lauder Grange, Corbridge-on-Tyne.
Mr. Walter F. Webb, Albion, New York, U.S.A.

Candidate Proposed for Membership.

Mr. John Stacey.

Member Deceased.

Mr. Edgar Leopold Layard, C.M.G., F.Z.S.

It was resolved that the Secretary write to Mr. Layard's representatives, expressing the Society's sympathy.

Paper Read.

"*Clausilia bidentata* with two mouths," by Hugh Lamont Orr.

Exhibits.

By Mr. H. L. Orr: *Clausilia bidentata* Str., with two perfect mouths, from Cave Hill, Belfast.

By Rev. H. A. Hudson: *Pecten opercularis* L., from the Isle of Man.

By Mr. F. Taylor: *Dreissensia polymorpha* Pall., attached to living shells of *Anodonta cygnea* L., from Bardsley Canal; and a remarkable abnormal specimen of *Carychium minimum* Müll., from Riversvale, near Oldham. The rarity of abnormalities in this species is noteworthy.

By the Manchester Museum: Some recent additions to the collection of Falkland Island mollusca, presented by Mr. Rupert Vallentin, who dredged them at Stanley Harbour in 1898-99.

287th Meeting, February 14th, 1900.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted:

Armature of helicoid landshells, by G. K. Gude; Priced check list of the landshells of the United States and Canada, by W. F. Webb; Bibliographia physiologica, vol. 1 and vol. 2, part 1, Zürich, and the usual periodicals received in exchange.

Donation to the Cabinet from Mr. J. Bliss:

Two specimens of *Clausilia (Oligoptychia) blissi.*

New Member Elected.

Mr. John Stacey, 16, Durham Road, Plumstead.

Candidates Proposed for Membership.

Mr. J. H. Killingbeck; Mr. Joseph Moorcock; Mr. Charles Pannell, Jr.; Mr. C. P. Richards; Mr. E. H. Solly.

Resignation.

Mr. W. E. Scharff.

Letter Read.

From Mr. Leopold Layard:—

"BUDLEIGH-SALTERTON,
"DEVON.
24th January, 1900.

"Dear Sir,

"Will you please give my best thanks to the Conchological Society for its very kind sympathy with me on the death of my father. He had begun collecting shells when a small child in Florence, to the discomfort of his nurse and the anger of his parents, who said that no gentleman did such things. He was exchanging specimens a week before he died.

"Yours sincerely,
"LEOPOLD LAYARD."

The Secretary, Conchological Society.

Paper Read.

"The land and freshwater shells of Tenby," by A. G. Stubbs.

Exhibits.

By Mr. J. Bliss: Specimens of a new species of *Clausilia* from Konia (the ancient Iconium), Asia Minor; they had been submitted to Dr. Boettger, who had recently described them under the name *Clausilia (Oligoptychia) blissi*. They are closely related to *Clausilia fausta* Pfr., but much larger, having sixteen whorls as against twelve, and measuring 25 to 26·5 mm. as against 19 mm.

By Mr. W. Moss: Specimens of *Diplomorpha layardi* and *D. delautouri* from the New Hebrides.

By Mr. B. R. Lucas: A series of land and freshwater shells chiefly collected in Ireland; amongst them was a form of *Succinea* from Roughty Bridge, which is possibly a new variety of *S. oblonga*.

By Mr. F. Taylor: *Ancylus patelloides* from California, an old species recently re-discovered; and *A. subrotundatus* from Oregon, that has often been mistaken for it.

By Mr. J. W. Baldwin: A peculiar form of *Limnæa palustris* from Blackpool.

288th Meeting, March 14th, 1900.

Mr. J. Cosmo Melvill in the chair.

New Members Elected.

Mr. J. H. Killingbeck, Garth, near Llangollen.
Mr. Joseph Moorcock, 119, Arngask Road, Catford, London, S.E.
Mr. Charles Pannell, Jr., East Street, Haslemere.
Mr. C. P. Richards, Mission House, Stenalees, St. Austell, Cornwall.
Mr. E. H. Solly, 3, South Street, Deal, Kent.

Donations to the Library announced and thanks voted:

International Catalogue of scientific literature, Queensland volume; Report on the mollusca of the "Jackson-Harmsworth" Expedition, etc., by J. C. Melvill and R. Standen; Hints on cleaning the smaller transparent species of British land mollusca, by A. G. Stubbs; Some mollusca and the microscope, by W. M. Webb; and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted:

Buliminus (*Chondrula*) *tricuspidatus* (Küster), from Mr. J. Bliss

Donations to the Fund for clearing off adverse balance announced and thanks voted :

	£	s.	d.
Rev. R. Boog Watson ...	2	2	0
R. D. Darbishire	2	2	0
W. Whitwell	1	1	0
John H. Ponsonby	1	1	0
J. Watson	1	1	0
J. C. Eccles	1	1	0
R. Welch	1	1	0
P. B. Mason	1	0	0
Lt.-Col. G. H. Parry ...	1	0	0
E. J. Bles	0	15	0
J. C. Cooper	0	10	6
J. C. Dacie	0	10	6
J. E. Neild	0	10	6
W. Moss	0	10	6
E. C. Stump...	0	10	6
R. Cairns	0	10	0
Rev. G. A. F. Knight ...	0	10	0
Thos. Rogers...	0	10	0
B. R. Lucas	0	10	0
W. L. W. Eyre	0	5	0
C. Fielding	0	5	0
Ph. Dautzenberg	0	5	0
E. J. Elliott	0	5	0
Mrs. J. M. Blundell... ...	0	5	0
H. L. Orr	0	3	0
Wm. Blake	0	2	6
TOTAL	18	7	0

Balance Sheet.

The balance sheet for 1899, having been passed by the auditors, was laid upon upon the table :—

BALANCE SHEET.

Receipts.	£	s.	d.
Balance forward	0	15	0
Subscriptions	57	5	0
Life Composition Fees ...	9	9	0
Donation	1	0	0
Sale of Publications	8	3	9
	76	12	9
Balance due to Treasurer ...	5	8	9
Audited and found correct, EDWARD COLLIER. E. C. STUMP.			
	£82	1	6

Expenditure.	£	s.	d.
Journals for Apr., July, Oct., 1898, and Jan., 1899	50	7	11
Reprints	0	19	7
Stationery	8	16	11
Bookbinding	1	6	3
Printing Plates and Drawings	7	0	6
Photographs	0	10	0
Parts 2 to 5 of Taylor's Monograph	1	1	0
Treasurer's Expenses ...	3	0	0
Secretary & Editor's Expenses	8	19	4
	£82	1	6

Paper Read:

" *Helix marmorata* var. *alba* nov.," by K. H. Jones.

May Meeting.

On the invitation of Mr. J. Cosmo Melvill it was decided that the meeting for the month of May should be held on Saturday, May 5th, at 4 p.m., at his residence, Brook House, Prestwich. Mr. Melvill stated that the President would attend the meeting and that he himself hoped to communicate a sketch of Lovell Reeve.

Exhibits.

By Mr. J. Bliss: *Buliminus* (*Chondrula*) *tricuspidatus* Küster, from Smyrna. The type of this species is in the Munich Collection, and beyond the specimens there it has hitherto been little known, although described many years ago.

By Mr. Thos. Edwards: *Limnæa stagnalis* of a large and unusually ventricose form, from Wistow Park, Leicestershire; a large, strong, dark coloured form of *L. auricularia* from Saddington Reservoir; *Helix virgata*, showing remarkable extremes in size, from Margate; and an interesting little collection of marine shells

picked up on the beach in Recherche Bay, Spitzbergen, amongst them being a fine series of *Buccinum glaciale* and its variety *angulosa*, *B. tenue*, *Neptunea despecta*, *Astarte borealis*, and some large valves of *Saxicava arctica*.

By Mr. Ed. Collier: Some fine examples of *Euhadra senckenbergiana* Kob., *E. myomphala* v. Marts., and *E. blakeana* Newc., from Japan; and *Euhadra connivens* Pfr., *E. mercatoria* Gray, and *E. largillierti* Ph., from Loo Choo; also two vases of native ware from Chemulpo, Corea, decorated with marine shells, which are placed in situ before the vases are baked in the oven.

By Mr. J. C. Melvill: A collection of terrestial mollusca from the Island of Socotra, collected by Mr. and Mrs. Theodore Bent, and the Forbes-Ogilvie-Grant Expedition to that island. The most interesting forms are a section of *Buliminus*, with conspicuously toothed peristome, the high development of the genus *Opeas*, culminating in the large *Stenogyra decipiens* Smith, the fine *Otopoma* and *Lithidion* amongst the Operculates, while the Helicidæ proper seem conspicuous by their almost entire absence. As might be expected from its geographical position, the forms of molluscan life infringe closely on those of the South Arabian region (Dhofer and the Hadramaut) also explored to some extent by the late Mr. Theodore Bent, and also on those of Somali Land and Abyssinia.

By the Manchester Museum: A number of interesting additions to the collection of *Oleacina* and *Streptaxis*, including some remarkable forms, from the collection of the late M. H. Crosse.

It was decided to have a special exhibit of the genus *Partula* at the April Meeting, and members are invited to send species for confirmation or comparison.

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The Nautilus, vol. 13, no. 8-10, Dec., 1899-Feb., 1900.

"Note on *Sigaretus oldroydii*," by W. H. DALL [adult dredged in Drake's Bay, Cal.]. "*Modiola plicatula* Lamarck in San Francisco Bay," by R. E C. STEARNS. "Note on the *Clausiliæ* of Celebes," by E. R. SYKES [comments on Sarasin's work]. "Notes on the mollusca of Canandaigua Lake Region, N.Y.," by C. T. MITCHELL [list of 47 spp.]. "New Southern Unios," by B. H. WRIGHT [*U. conjugans*, Hiawassa R., Polk Co., Tenn.]. "*Pisidium handwerki*, n.sp." [Lilycash Creek, Joliet, Ill.], by V. STERKI. "Origin of the mutations of *Ostrea*," by W. H. DALL. "An attempt to define the natural groups of *Strombus*," by G. H. CHADWICK.

"Changes with growth of *Lithasia obovata* (Say)," by B. WALKER. "Note on *Thysaniphora hornii* Gabb," by H. A. PILSBRY [description of sculpture and criticism of published figures]. "A new species of *Capulus* [*C. californicus*] from California," by W. H. DALL. "Mollusca associated with Mastodon remains," by R. E. C. STEARNS [6 species]. "Dredgings in San Diego Bay," by F. W. KELSEY. "A list of shells from North-Eastern Maine," by OLOF O. NYLANDER [90 spp. L.F.W.]. "Some Zonitidæ collected by J. H. Ferriss in Arkansas and the Choctaw nation," by H. A. PILSBRY [*Zonites brittsii=Gastrodonta demissa*]. "A new American land shell," by H. A. PILSBRY [*Polygyra uvulifera bicornuta*, Aripeka, Hernando Co., Fla.].

"A new Alabama *Unio* [*U. (Pleurobema) hagleri*, N. River, Alabama, figd. on pl. ii.], by L. S. FRIERSON. "Species of *Chlorostoma* of Southern and Eastern Patagonia," by H. A. PILSBRY [*C. hidalgoi*, *C. orbignyanum*, nn.spp.]. "On a collection of freshwater shells from Rhode Island," by F. C. BAKER [13 spp.]. "John H. Thomson, Ph.D." [obituary notice], by A. B. KENDIG. "New species and sub-species of American land snails," by H. A. PILSBRY [*Pyramidula alternata rarinotata*, Texas, *Zonitoides neo-mexicanus*, New Mexico]. "Field notes and reminiscences" [collecting in Florida and California], by R.E.C.S. "Some notes on *Rumina decollata* Linn.," by C. W. JOHNSON [devoured *H. ericetorum*]. "*Limax coccineus* Gistel," by T. D. A. COCKERELL [? *Arion rufus*]. "*Polygyra auriculata* in Western Florida," by H.A.P. "Correction to list of shells from North-Eastern Maine in January number," by OLOF O. NYLANDER.

The Journal of Malacology, vol. 7, no. 4, December, 1899.

"On the anatomy and systematic position of some recent additions to the British Museum collection of slugs," by W. E. COLLINGE [*Anadenus sechuenensis* n.sp., *Tebennophorus bilineatus* Benson, anatomy, pls. iv., v.]. "On two new varieties of *Cataulus nietneri* G. & H. Nev., from Ceylon," by O. COLLETT [v. *unicolor* and v. *caperata* with figures.] "*Helix* (*Epipragmophora*) *kelletti* Forbes and its habitat," by Mrs. M. B. WILLIAMSON [on the prickly-pear cactus, *Opuntia vulgaris*]. "On the relative claim to priority of *Papuina wiegmanni* and *P. tuomensis*," by G. K. GUDE [former name valid]. "Notes on some specimens of *Plectopylis*" [from the Theobald collection, Mason Coll., Birmingham], by G. K GUDE. "Additional records to the mollusca of Carnarvonshire and Merionethshire' [11 spp. and varr., Nevin and Aberdovey], by H. H. BLOOMER.

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"Reversed *Helix ericetorum* at Bundoran," by R. WELCH. "*Arion ater* var. *bocagei* in Ireland," by R. F. SCHARFF. "*Amphipeplea glutinosa* Müller, in Ireland," by R. WELCH. "Snail-shells and hedgehogs," by C. B. MOFFAT [broken shells left by hedgehogs, which have fed on the snails]

The Naturalist, no. 516-518, Jan.-Mar., 1900.

"Land and freshwater mollusca observed near Tadcaster," by F. G. BINNIE [59 spp. with localities]. "Land and freshwater mollusca in Northumberland," by Miss M. V. LEBOUR [50 spp. and varr].

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"Descriptions of new land shells, with notes on known species," by CH. HEDLEY [*Papuina mayana*, Rossville, Queensland; *Endodonta aculeata*, Wollon-

gong, N.S.W. ; *E. norfolkensis*, Norfolk I., *Dendrotrochus mentum*, Ralum, New Britain ; nn.spp. all figured].

Transactions of the Royal Society of South Australia, vol. 23, pts. 1, 2.

"Older Tertiary Fossils from the Murray Desert,' by R. TATE [*Fusus trivialis*, *Volutolithes antispinosus*, *Mitra diductua*, *Cassis contusus*, *Surcula vardoni*, *Cerithium torrii*, nn. spp., figd.]. "A revision of the Australian Cyclostrematidæ and Liotiidæ," by R. TATE [*Cyclostrema* divided into four sections, *Cyclostrema*, s.s., *Tubiola*, *Lodderia* (= *Cyclostremella* Tate, *non* Bush), *Pseudoliotia*; 17 spp., 7 nn. ; *Liotia*, 10 spp., 2 nn. figd.]. "Contributions to a revision of the recent Rissoidæ, of Australia," by R. TATE [*Rissoia*, 4 subgg., *Rissoina*, 4 subgg., 3 nn. spp. figd.]. "Definitions of new species of land shells from South Australia," by R. TATE [*Glyptorhagada euglypta*, *Angasella polypleura*, *Flammulina pulleinei*, *Helicina crassidens*, all figd.]. "A revision of the Older Tertiary Mollusca of Australia, part I—Palliobranchiata, Pteropoda, Scaphopoda and Lamellibranchiata (*pars*)," by R. TATE [numerous nn. spp. descr. and figd.].

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"Scalariform *Helix aspersa*" [Blaise Castle Wood], by S. G. PERCEVAL. "*Vertigo substriata*" [Westerham, Kent]; "The homing of *Limax flavus*," by W. M. WEBB [eating soap]." "Production of sound by mollusca," by A. E. BOYCOTT [noise made by *Limnæa stagnalis* expelling air near the surface of the water]. "Notes from Buckinghamshire," by the Rev. E. P. BLACKBURN [*Bythinia tentaculata* with white spiral band; active movements of *Physa fontinalis*]. "Mollusca in intermittent streams," by the Rev. R. A. BULLEN. "Rock-boring *Helices*," by A. E. BOYCOTT [mantle-mucus alkaline]. "The colouring of some Essex shells," by the Rev. E. P. BLACKBURN.

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Vol. 33, 1898 (1899).

"Diagnoses de quelques coquilles et d'un genre nouveau provenant de l'état indépendant du Congo," by Dr. PUTZEYS [*Limicolaria wathenensis*, *L. paludosa*, *L. distincta*, *L. congolanica*, *Pyrgopsis nyangwæensis*, nn.spp., *Perideriopsis umbilicata*, n.g., n.sp.]. Continuation [*Paludina leopoldvillensis*, *Lanistes bourguignoni*, *Unio leopoldvillensis*, *Spatha cryptoradiata*, *Burtonia carrei*]. Continuation no. 2 [*Livinhacia dupuisi*, *Achatina rugosa*, *A. sylvatica*, *Ganomidos pellucidus*, *Pseudoglessula* ? *phœa*]. "Diagnose d'une coquille nouvelle provenant de l'état indépendant du Congo," by Dr. PUTZEYS [*Ampullaria leopoldvillensis*, all figured].

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"**Notes on Paludestrina jenkinsi** (Smith) **and P. confusa** (Frauenf.)," by A. S. KENNARD and B. B. WOODWARD. (*Proc. Mal. Soc.*, vol. 3, part 6, 1899, p. 297-300).

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"**Kinderhook Faunal Studies.** 1. The fauna of the Vermicular Sandstone at North View, Webster County, Missouri." By STUART WELLER. (*Trans. Acad. Sci. St. Louis*, vol. 9, no. 2, 1899, p. 9-51, pl. 2-6) [list of mollusca, several nn. spp. figd.],

"**The Terrestrial Mollusca of Michigan**" [list of 75 spp., none new], by BRYANT WALKER.

"**Description of Conus (Cylinder) clytospira,** sp. nov., from the Arabian Sea," by J. C. MELVILL and R. STANDEN (*Ann. and Mag. Nat. Hist.* (7) vol. 4, pp. 461-3, Dec., 1899).

"**A complete priced check list of the land shells of the United States and Canada,**" by WALTER F. WEBB [a four page leaflet with list of 258 spp.].

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SIR RAWSON WILLIAM RAWSON, K.C.M.G., C.B., &c.

By J. COSMO MELVILL, M.A.

(Read before the Society, December 13th, 1899).

The death of Sir Rawson Rawson at his residence, 68, Cornwall Gardens, London, in his eighty-eighth year, on 20th November, removes one whose long and successful life was full of interests—official, secretarial, statistical, and biological.

Born in 1811, he was educated at Eton, and in 1830 became Secretary to Mr. Poulett Thomson, then Vice-President of the Board of Trade; four years later, in 1834, he was appointed Secretary to the President, Mr. A. Baring. In 1841 Mr. Gladstone selected him as his Private Secretary in the same office (the Board of Trade), but a year later, in 1842, he received from Lord Derby his first colonial appointment as Chief Secretary for Canada. From there he was transferred to Mauritius, and after holding for several years the post of Treasurer of that island, he was appointed Colonial Secretary, in 1854, at the Cape of Good Hope, after which he was elected to the Cape Parliament, then newly constituted, and was made a C.B. in recognition of the many services rendered as Financial Minister. Ten years later, in 1864, he was appointed Governor of the Bahamas, and in 1869 of the Windward Islands, retiring in 1875, when he received the well-merited honour of a knighthood.

Sir Rawson was a well-known figure in scientific circles. He was especially devoted to geographical research, and at one time served on the Council of the Royal Geographical Society. The meetings of the Statistical Society also claimed a large share of his attention, and he held the Presidency of this latter from 1884-85. He was also the first President of the International Statistical Institute, holding that office till 1899, when failing health and advanced age compelled him to retire, and even then, so great had been his services, he was unanimously requested to continue as its Honorary President. He contributed several statistical pamphlets and works on various subjects of imperial interest, including one on the tariff and trade of Great Britain and her empire. He was also a fellow of the Geological Society, and of several other learned bodies, including the Conchological Society of Great Britain and Ireland. In this science he took a particular interest; indeed he had amassed a large collection of mollusca, principally gathered by himself at the Bahamas, Mauritius, South Africa, etc., and had increased it much by exchanges with individuals and museums. His collection, numbering about 8,000 species of shells, is particularly rich in land operculates, but the marine shells, *e.g.*, *Conus*, *Mitra*, etc., are also well represented.

He was, moreover, an adept in botanical research, and during his residence at the Cape, in conjunction with Dr. Pappe, the Colonial botanist, he formed collections which were of the greatest service to Drs. Harvey and Sonder, the authors of the "Flora Capensis." In dedicating to him a genus—*Rawsonia*—belonging to the natural order *Bixineæ*, these authors write as follows:—[1] "The generic name of *Rawsonia lucida* is bestowed in honour of Rawson W. Rawson, Esq., C.B., Secretary to Government, C.G.H., a gentleman strongly attached to natural history, and joint author of a *Synopsis Filicum Africæ Australis*, and to whom the authors of the *Flora Capensis* wish to express their sense of obligation for countenance and assistance afforded to their undertaking." I recollect his pleasure when I showed him a specimen of this plant (a handsome shrub with white flowers and glossy leaves) in my herbarium, and he declared that it was the first time he had had the opportunity of seeing a specimen.

My personal acquaintance with Sir Rawson did not begin till about twelve or thirteen years ago, when he visited my house at the time of the British Association meeting in 1887. He possessed a particularly genial, winning manner, and was always ready to give any information with great good nature on any subject he had studied. As already mentioned, conchology was his favourite science; he was a collector of the old school, rigidly systematic, and full of reminiscence of the days of Cuming, Stainforth, Reeve, Broderip, the elder Sowerby, and other men famous in conchology half-a-century ago. He was a great friend of Mr. F. W. Townsend, and encouraged him in the prosecution of his dredging expeditions in the Arabian Sea and Persian Gulf, which for the past six or seven years he has carried out with unusual assiduity and success. Indeed the last time I met Sir Rawson was in June, 1898, at the house of Mr. Townsend's brother-in-law, Dr. Campbell Pope, at Shepherd's Bush, and though much aged and looking very frail, he still continued to take his wonted interest in these later discoveries, notably those of *Scalaria fimbriolata*, *Mitra stephanucha*, and a species which, at Mr. Townsend's request, I had named *Sistrum rawsoni*. This has been dredged in great quantity subsequently, and might stand, on conchological grounds alone, equally well as an *Eugina*, *Cantharus*, or a *Sistrum*.

All those who knew him will keenly feel the loss of one who combined with so kindly a nature the fruits of such large experience in so many fields of research. Indeed, it has been given to few men to possess such varied attainments as did the lamented subject of this notice.

1 Flora capensis, vol. 1, p. 67.

THE LAND AND FRESHWATER SHELLS OF TENBY, SOUTH WALES.

By ARTHUR G. STUBBS.

(Read before the Society, February 14th, 1900).

Tenby has long been noted for Marine Mollusca, also for the very local snail *H. pisana*; but I believe that no serious attempt has hitherto been made to form a complete list of the other land and freshwater species that are to be found in the district. I have confined this list to the immediate neighbourhood of Tenby (roughly a radius of three miles from the centre of the town) with the exception of a few references to Pendine, which has sandhills and marshes very similar to those at Tenby; and to the neighbouring village of Manorbier.

The most noteworthy absentees from the land forms are the species of *Vertigo*, but these minute shells are easily overlooked and possibly one or two species do occur. Of the freshwater forms *Valvata cristata* is the only representative of the order Operculata that is found in the district; this would in some measure be accounted for by the absence of rivers, canals, or large bodies of water; though the two *Bythiniæ* and *V. piscinalis* might have found conditions suited to them in the Ritec stream, or some of the ditches in the marshes. The Unionidæ are only represented by *Anodonta anatina* var. *complanata*; however, the reason given above in the case of the Operculata would apply equally well to this group.

I am indebted to Messrs. L. E. Adams and W. Denison Roebuck for their kindness in authenticating several of the slugs for me.

Brackets denote species given on the authority of others, but which have not as yet been confirmed personally. The nomenclature is that of the Conchological Society's List.

Arion ater.—Common, the type form being the one usually met with.

Var. **brunnea.**—Specimens from Holloway Quarry, and Hoyle's Mouth, not common.

Var.————?—An interesting banded form of this species is to be taken down by the Harbour, from under old logs. In young specimens the bands are very distinct, but as the animal approaches maturity, the bands become rather fainter and the whole slug much darker. There is a dark band down the centre of the back, and one down each side, the intervening spaces being pale grey or sometimes pale yellow. The cross-striation on the foot-fringe is of the same shade as the dark bands, but is faint on very young specimens.

A. subfuscus.—Two specimens were taken from a plantation in Heywood Lane.

A. hortensis.—Common everywhere. A reddish-brown form which might be referred to the var. *rufescens* is not uncommon.

A. circumscriptus.—Not uncommon.

Amalia gagates.—Deer Park, North and South Cliffs, but not nearly so plentiful as the next species.

A. sowerbyi.—Very common and often very large. Specimens from the North Cliff have unusually thick shells.

Var. **nigrescens.**—Not uncommon with the type at Deer Park and on the North Cliff.

Limax maximus.—Fairly plentiful in the neighbourhood, occasionally large, but generally rather sober in colouring.

Var. **cellaria.**—Three specimens at Deer Park, and one in Heywood Lane.

L. flavus.—Common under stones and refuse on the North Cliff, near the Harbour. A form approaching the var. *virescens* is found with the type in this spot. One specimen had its shell enclosed in a pad of jelly-like matter.

L. marginatus.—Not uncommon on moss-covered rock on the North Cliff after rain; in dry weather they ensconce themselves in the crevices of the rock. They are also found on ash-trees in the Cemetery Lane and beech-trees at Penally.

Agriolimax agrestris.—Abundant everywhere.

Var. **sylvatica.**—North Cliff.

Var. **lilacina.**—North Cliff.

A. lævis.—Common under stones and among the leaves of the yellow Iris.

[Testacella haliotidea].—This species is recorded from Tenby by L. E. Adams (Collector's Manual, ed. 2, p. 40).

T. maugei.—Several fine specimens in garden at Deer Park. A large number were brought to me from a garden at Penally, by the gardener, who had found them while removing a manure heap. They have also been taken in considerable numbers from a garden on the Saundersfoot Road.

Vitrina pellucida.—Common in the neighbourhood. The clouded green form from under stones on the railway banks, and from the stems of Common Alexanders below the Wreck Field; beautiful clear green specimens from the sea-cabbage and fallen leaves on the North Cliff.

Var. **depressiuscula.**—The majority of specimens from the North Cliff are of this form.

Hyalinia draparnaldi.—Two or three colonies of this species in the neighbourhood. The largest among stones and rubbish lying on a damp corner of the Burrows, beneath the Wreck Field and railway banks. An hour's search in this spot, during the month of January, has produced as many as sixty or seventy fine large specimens. There are also colonies by the gasworks, Mason's coalyards, and in a plantation at the bottom of Heywood Lane.

H. cellaria.—Abundant; particularly fond of the Common Alexanders; may be taken in great numbers clustering about the stems and roots.

Var. **complanata.**—Occasionally with type. South Cliff, etc.

Var. **albina.**—Not uncommon with the type in various places; shells as a rule are of the clear white form, but sometimes the clouded one has turned up.

[H. glabra].—Said to occur at Hoyle's Mouth; perhaps the next species, which is particularly fine there, was mistaken for it.

H. alliaria.—Common and widely diffused. A large number have been taken from the top of a mossy wall, beneath the railway arches at the bottom of Heywood Lane. A pale and very glossy form has been found under elm logs at Gumfreston.

Var. **viridula.**—Fairly common at the roots of long grass on the north side of St. Catherine's rock.

H. nitidula.—Widely distributed but nowhere very abundant. Shells from the top of St. Catherine's Rock are thinner and not so white round the umbilicus as usual. Specimens from Hoyle's Mouth are much paler than usual.

H. pura.—Rather scarce. It has been taken at Hoyle's Mouth, etc.

Var. **margaritacea.**—Hoyle's Mouth, where it is rather more plentiful than the type.

H. crystallina.—Not common; sparingly at Hoyle's Mouth, Heywood Lane, etc.

H. fulva.—A few specimens under stones on Gumfreston Marsh.

H. nitida.—A large colony on marshy ground in front of Holloway Quarry. After rain they come out in fair numbers to crawl over the wet mud, and the leaves of the yellow Iris. Another colony in a ditch near the Black Rock railway bridge, and in Penally Marsh. A scalariform monstrosity was found at the second-named locality.

[H. excavata].—Hoyle's Mouth (*fide* Chas. Jefferys).

Helix rotundata.—Abundant, but generally rather small. A curiously twisted and scalariform specimen on the North Cliff.

Var. **turtoni.**—Occasionally with the type.

Var. **pyramidalis.**—Under stones by a ditch at Giltar.

H. rupestris.—Abundant on limestone walls or quarries.

[Var. **viridescenti-alba**].—Wall by Penally Station (*fide* the Rev. H. Milnes).

H. aculeata.—Hoyle's Mouth, but not plentiful; it seems to prefer the leaves of the holly and ash.

H. pulchella.—Common under stones and logs on Penally and Gumfreston Marshes, and occasionally elsewhere.

Var. **costata.**—Common on old walls at Giltar, the Castle Hill, St. Catherine's Rock, and Hoyle's Mouth. In drier situations than the type in this neighbourhood, though both have been taken together from under stones on Gumfreston Marsh.

H. aspersa.—Very abundant and very variable. The cleanest and handsomest specimens come from the South Cliff and Jubilee Gardens. They swarm on the Burrows and at Giltar.

Var. **conoidea.**—Common on the Marsh Road and Castle Hill.

Var. **globosa.**—Not uncommon on the Burrows near the Black Rock, the Jubilee Gardens, and the Wreck Field.

Var. **minor.**—Common in gardens overlooking the South Cliff, etc. Also *conoidea-minor*, *globosa-minor*, *zonata-minor*, *undulata-minor*, and *nigrescens-minor*.

Var. **tenuior.**—Two genuine specimens from Deer Park.

Var. **nigrescens.**—Occasionally on the North Cliff, and in private gardens.

Var. **undulata.**—Common in various places.

Var. **flammea.**—Genuine specimens scarce; forms approaching it are very common.

Var. **albofasciata.**—Not common; Marsh Road and Holloway Quarry.

Var. **zonata.**—Not uncommon; South Cliff, the Burrows, Giltar, etc.

Var. **exalbida.**—Rare, a few specimens near Gumfreston.

Var. **rufula-zonata** nov.—Three specimens of a form having the same ground-colour as the last variety but with translucent reddish bands have been taken, two from the Narberth Road, and one from Deer Park. A very lovely shell.

Two scalariform monstrosities have been found, and a curious specimen much compressed at the sides, giving it a squarish outline.

H. nemoralis.—Abundant on the Burrows, on the railway banks, at Giltar, etc., but very local. Shells from the Burrows are generally large and thick, the bandings 12345, (12)345, 00300 and 00000 being most often met with, though two of the rare banding 12045 have been taken. On the North Cliff there is a pale form of var. *libellula* 00300 with a lilac blush near the mouth, and also var. *bimarginata*. Near

Gumfreston var. *roseolabiata* occurs sparingly, and a few specimens of vars. *minor* and *conica*. At Manorbier var. *roseozonata-roseolabiata*, var. *citronozona-luteolabiata* and a specimen of var. *libellula* 020(45).

H. hortensis.—Fairly common but local, the var. *lutea* 00000 being the most frequently met with. On the North Cliff the shells attain to a very large size; two specimens with the scarce banding 12045 were found there. In Heywood Lane the bandings (12345), (123)(45), and 1(23)(45), are common. The banding 10345 is very common in several localities. Near Gumfreston var. *luteo-roseolabiata* is not uncommon, and var. *arenicola* is occasionally found.

H. arbustorum.—There is a colony of this species in a lane near Hoyle's Mouth, the only known locality within the three-mile radius. Mostly of the type form, but a very fine specimen of the var. *conoidea* turned up. There are several colonies of *H. arbustorum* at Manorbier, Pendine, and Laugharne.

H. rufescens.—Very abundant. The largest specimens from the North Cliff measure 15-16 mm. in breadth; they live on brambles and sea-cabbage down by the sea-wall where they get a good sprinkling of salt water at the high spring tides.

Var. **depressa.**—Below the Wreck Field and on St. Catherine's Rock; generally quite flat-spired, and often much eroded. In some cases the spire is below the level of the last whorl. The type, vars. *rubens*, *albocincta*, and *alba* are all found in this depressed form in both places.

Var. **rubens.**—Very common with type.

Var. **albocincta.**—Common with type.

Var. **alba.**—Fairly common with type.

H. hispida.—Not common; its place is apparently taken by the next species. It has been found at Hoyle's Mouth, Gumfreston, and in the Jubilee Gardens.

Var. **hispidosa.**—This is the chief form at Gumfreston.

Var. **nana.**—Giltar.

Var. **subrufa.**—This is the chief form at Hoyle's Mouth.

H. granulata.—Abundant and widely diffused. This snail, like *Hyalinia cellaria*, is very fond of the Common Alexanders, and is also very partial to nettles. It is very variable in size and colour, shading from almost pure white to dark-horn colour. The shells of those living on the North Cliff are very thin and sparsely clothed with hairs.

Var. **cornea.**—Not uncommon with type.

Var. **albida.**—Occasionally with the type.

H. fusca.—Several colonies near Hoyle's Mouth. I have taken them most plentifully from among the fallen leaves of the Mountain Ash in the late autumn; in the summer they are found among nettles and long grass. It also is to be found at Scotsburgh and near the Cemetery.

H. pisana.—Exceedingly abundant. Its ascertained range in this neighbourhood up to the present is as follows, beginning east:—

1.—From the bottom of the Norton to the distance of about a mile up the Narberth Road. This is the most inland locality. They were in all probability imported with South Cliff plants into a garden in the first place, and have gradually spread up the roadside where they are now fairly abundant. Shells of fair size, flatspired, lips cream or pink.

2.—Castle Hill. Abundant on the south-west side. Shells usually small, flat-spired, and scantily marked. Lips cream, very rarely pink.

3.—St. Catherine's Rock. Abundant on the south-west side, small, markings very variable; not so abundant on the north-east side, but as a rule larger, with raised spires. Lips cream, never pink.

4.—South Cliff from Life-boat House to Jubilee Gardens. Very abundant especially beneath the Esplanade. The vars. *minor*, *lineolata*, *albida*, *alba*, and numerous other modifications of the shell, as well as occasional scalariform specimens have been taken from among the myriads that cluster on the stalks of the Common Alexanders and Red Spur Valerian. Lips both cream and pink, but chiefly the former.

5.—Jubilee Gardens to railway bank beneath the Wreck Field. Very abundant. At the bottom of the Gardens near the Burrows, a small, thick, and very prettily-marked form is found on the wild sage and brambles. Beneath the Wreck Field, a large, thin form, with an expanded mouth is not uncommon on Mustard Cherlock; while nearer the railway bank, on Fennel and brambles, specimens with the pink lip-colour suffused on the outside of the shell near the mouth are common. Lips cream and pink, the latter being very common in this locality.

6.—The Burrows and railway banks. Abundant, especially on the hillocks nearer the sea, and around the Black Rock. The shells are very uniform in character, being rather thick and stunted, with the regular type form of marking; or else belonging to the var. *albida* which is very common in some spots. The lips are always cream, with the exception of a few pink-lipped wanderers from No. 5 locality.

7.—Giltar. Plentiful in patches on the top and along the cliffs nearly to Lydstep, where there is a break till it appears again at Manorbier. The shells are similar to the last but usually more bleached, and not so solid.

8.—Caldy Island. Fairly common on the south side of the island. Shells like the last.

9.—Odd specimens of *H. pisana* have also turned up at Saundersfoot, Penally, and on the North cliff, but these have obviously been imported.

Var. **tenuis.**—The Rev. J. W. Horsley and myself have each taken a single specimen of this peculiar form.

Var. **minor.**—Common on the Burrows near high-water mark, and in the Jubilee Gardens down by the Burrows.

Var. **lineolata.**—Common with type in most places.

Var. **albida.**—Abundant. Pink-lipped specimens are not so common.

Var. **alba.**—Rare. South Cliff beneath the Esplanade, Jubilee Gardens, and railway bank below the Wreck Field. The banded form (var. *hyalozonata*) is the one usually met with.

Monstrosities.—I have taken three fine scalariform specimens.

Besides the above-named varieties the following modifications of the shell are worthy of notice:—

1.—Shells having the spire plain white, but the usual banding, or rows of dotted bands, on the body-whorl. Common.

2.—Shells plain white, with the exception of a single dotted band round the periphery. Common.

3.—Shells with arrow and feather-like markings in place of the usual banding on and above the periphery. Not uncommon.

4.—Shells much depressed above and below. Common.

5.—Shells very globose, last whorl much larger in proportion to the others. Marsh Road, not common.

6.—Shells larger and thinner with an inflated mouth, not uncommon by the Wreck Field.

7.—Shells smaller and exceedingly thin and light, the animal showing very plainly through the shell. Sea-cliff near Lydstep.

H. itala.—Abundant on the Burrows, the railway banks, round Holloway Quarry, and at Giltar; also a few colonies further inland. It is most plentiful on the Burrows between the Black Rock and Giltar. In winter time living, but much weathered specimens, may be be seen clinging to the long grass, and withered stalks of the Ragwort. The varieties are generally found in colonies except var. *albida* (=var. *alba* Charp.) which is always found with the type wherever the latter occurs. Shells taken from the 'Burrow Rose' have often a reddish or pinkish tinge which, however, fades very much after the animal has been extracted. The largest come from the top of the cliffs between Proud Giltar and Lydstep. Two specimens with a double band above the periphery have been taken on the Burrows. Slightly twisted specimens are not uncommon.

Var. **minor.**—Not uncommon in some parts of the Burrows, at Caldy Isle, and near the old quarry at the bottom of Heywood Lane.

Var. **hyalozonata.**—Rare, one specimen from St. Catherine's Rock, one from the Burrows, and two from Manorbier. At Pembroke Castle there is a small colony, living with *H. virgata*, vars. *alba* and *hyalozonata*, and *H. acuta* var. *alba*. Some of these *H. itala* are pure white without bands, and should properly be called var. *alba* to correspond with that variety in *H. pisana* and *H. virgata*. The common whitish form with a dark nucleus (var. *alba* Charp.) should be called var. *albida* or better still var. *albicans*.

Var. **leucozona.**—Fairly common at Giltar; intermediate forms between this variety and the type are common on the Burrows, and round Holloway Quarry.

Var. **albida** (=var. *alba* Charp.).—Abundant everywhere with the type.

Var. **lentiginosa.**—Common on the Burrows and round Holloway Quarry.

H. caperata.—Very abundant and widely diffused. It is very hardy and may be observed crawling about in mid-winter, even in a biting east wind. It is a great climber, especially in a young state, and on the Burrows, where walls and trees are wanting, it uses the tall stems of the Ragwort to roam over. Scalariform specimens are occasionally met with.

Var. **subscalaris.**—Not uncommon with type in a few places.

Var. **major.**—Not common.

Var. **ornata.**—Common.

Var. **fulva.**—Common; both light and dark shades are found, and it is sometimes speckled.

Var. **obliterata.**—Two good specimens from Holloway Quarry (A.G.S.); and one from the Castle Hill (C. E. Wright).

H. virgata.—Very abundant, and exceedingly variable in colouring and markings. The shells are, as a rule, small, but there are many sheltered places on the Burrows where they grow to a fair size; specimens from 16 to 18 mm. being not uncommon in some low-lying spots between the hillocks. On the tops of the hillocks the shells are as a rule smaller than in the hollows and flat places between the mounds, though they are usually more numerous in the first place. The purple-tinged specimens, so common at Giltar and Manorbier, may possibly owe their abnormal colouring to their very exposed and marine position, though I have taken the same form in the low-lying Ritec Gardens.

(To be continued).

EDGAR LEOPOLD LAYARD, C.M.G., F.Z.S., &c.

By EDWARD COLLIER.

(Read before the Society, April 11th, 1900).

By the death of Edgar Leopold Layard Natural History has lost an enthusiastic worker, and one who had very great opportunities of which he took full advantage. He died at his residence "Otterbourne," Budleigh Salterton, S. Devon, very early in the morning of Monday, the first of January, in his seventy-sixth year. Through his death we lose one of the few remaining links that connect us with the naturalists of the past generation.

His father was Henry P. J. Layard, who held a very high position in the Indian Civil Service in Ceylon. He had three brothers, the eldest being the Rt. Hon. Austen Henry Layard, the discoverer of Nineveh, and Ambassador at Madrid and Constantinople. The second was General Frederick Layard of the Indian Army; and the third Captain Arthur Layard, who died in the Crimea, whilst on Lord Raglan's staff.

Edgar Leopold Layard was the fourth son, and was born at Florence in July, 1824, and began his natural history work very early in life, as he well remembered collecting snails in the Boboli Gardens at Florence whilst quite a child. He went to Cambridge and was educated for the Church, but could not conscientiously sign the thirty-nine Articles, so studied for the Law. He married at the early age of twenty-one and left immediately for Ceylon, having received an appointment in the Civil Service, and rose to be Sheriff and Magistrate of the Point Pedro district. Here he had a splendid opportunity of following his taste for natural history in all its branches, as he not only collected land, freshwater, and marine shells, but worked at other branches as well. He was always extremely fond of birds and his extensive collection included many species new to science. He made a catalogue of the birds of Ceylon, and considerably helped the late Sir Emerson Tennant in writing his great work on that island. I remember very well his describing to me the locality where he discovered a new species of *Cataulus* (*C. layardi* Gray).

After residing in Ceylon for nearly ten years, he and his wife were forced to leave on account of ill health, when he came to England and worked at the collections he had made in Ceylon. In 1855, he went to the Cape and there joined the Colonial office. Here he was soon at work again in his favourite pursuits, and founded the present South African Museum in Cape Town, and was Curator of it until 1870.

He was Confidential Secretary to the Governor, the late Sir George Grey, and accompanied him to New Zealand during his second term as Governor there. He returned to the Cape in 1862 as Arbitrator in the "Mixed Commission Court" for the suppression of slavery, and was promoted to be High Commissioner of it until it was abolished in 1870, when he finally left the Cape. For a short time he joined the Foreign Office in London, but in 1872 he was sent as Consul to Para at the mouth of the Amazon. He remained there only nine months when he was recalled to England on being appointed as special Royal Commissioner to report upon the offered cession of Fiji, and was appointed Consul of Fiji and Tonga. After the formal annexation of Fiji he acted as "Administrator of the Government" for several months until the arrival of the first Governor, Sir Arthur Gordon.

He arrived in Fiji on New Year's morning 1874, and left it in June 1876, on being appointed British Consul at Noumea in New Caledonia. He lived here for some time, until he finally retired from Her Majesty's Service on pension in January 1890. For his services in Fiji, he received the decoration of Companion of St. Michael and St. George.

On his return to England he went to reside at Budleigh Salterton, S. Devon. His house, being fairly large, allowed him to make one of the rooms into a museum, where he placed on the walls a valuable ethnological collection, which I understand has been purchased for the Manchester Museum, Owens College.

He collected principally land and freshwater shells, and being naturally enthusiastic in his work, with the facilities he possessed, he very soon had such a collection as is very seldom seen outside a public museum. When I visited him for a short time in 1894, he told me with pride that his collection of shells numbered more than 8,000 species, and that he had never bought one in his life. He had either collected them himself, or exchanged with others, as he had large quantities of duplicates, having been in districts where shell life was prolific.

He knew personally, or had corresponded with, all the older conchologists, such as Adams, Cuming, Benson, Wollaston, Nevill, Garrett, etc., etc. He not only collected in all the districts where he had resided, but also in Madagascar, Mauritius (with the late Sir Henry Barclay), Comoro Islands, and also in many of the South Sea Islands, including the New Hebrides, etc.

Whilst at the Cape he wrote the "Birds of South Africa," since much enlarged by Dr. R. Bowdler Sharpe. He was also a constant contributor to the "Field" and other sporting papers.

He was very fond of fishing, and after his return from abroad, he went either to Scotland or Ireland every year for a few weeks' fishing, and kept accurate records of the number and weights of fish that he caught.

Through being abroad so much, and not having access to recent books on natural history or collections, he did not describe many of the species he found as being new to science, but sent them to his friends, who named a considerable number of species after him.

The following is a list of them, showing they were almost invariably from localities where he collected himself:—

Streptaxis layardianus Bens., Ceylon.
Helicarion layardi Nevill, ,,
Nanina layardi Pfr., ,,
Hyalinia layardi Thom., New Hebrides.
Helix (*Geotrochus*) *layardi* Hartm., New Hebrides.
Diplomorpha layardi Hartm., New Hebrides.
Buliminus layardi Melv. & Pons., South Africa.
Pupa layardi Bens., South Africa.
Achatina layardi Pfr., West Africa.
Stenogyra layardi Bens., Ceylon.
Cœliaxis layardi Ad. & Ang., Cape of Good Hope.
Auricula layardi A. Ads., Ceylon.
Melampus layardi A. Ads., ,,
Mitra layardi A. Ads., ,,
Engina layardi Melv., ,,
Tympanotonus layardi A. Ads., Ceylon.
Pirenella layardi A. Ads., Ceylon.
Melania layardi Dohrn, ,,
Paludomus loricatus Rve., var. *layardi* Rve., Ceylon.
Solarium layardi A. Ads. (=*S. hydridum* L.), Ceylon.
Cingula layardi Martens, Tasmania.
Ampullaria layardi Rve., Ceylon.
Cataulus layardi Gray, ,,
Cyclophorus layardi H. Ads, ,,
Omphalotropis layardi Pfr., Mauritius.
Helicina layardi Cr., New Britain.
Stoastoma layardianus Chitty, Jamaica.
Neritina layardi Rve., Ceylon.
Spondylus layardi Rve., ,,
Pecten layardi Rve., ,,
Nucula layardi A. Ads., ,,
Unio layardi Lea, ,,
Scintilla layardi Desh., ,,
Psammobia layardi Desh., Philippines.
Paphia layardi Desh., Ceylon.
Chione layardi Rve., ,,
Lucina layardi A. Ads., ,,
Tellina layardi Desh., ,,

Clausilia biplicata (Mont.) **white variety.**—In reference to this variety, for which, misled by its omission in text books by British authors, I proposed (*antea*, p. 232) the name of *alba*, I find that Westerlund (Fauna Moll. Suec. Norv. et Dan., 1873, p. 198) describes a var. *albina*, which he characterizes as "*pallidissime virenti hyalina*. Paetel, in his well-known "Catalog," also records a variety as *albina* Bttg. from the "Taunus." Mr. E. R. Sykes informs me that he has for some years past possessed white examples of *Cl. biplicata* from Austria and Bohemia, so the form is evidently familiar to Continental conchologists. Mr. J. W. Taylor (*J. Conch.*, vol. 1., p. 216, 1877) records the white variety from Heidelberg under the name of *albida*, and his name necessarily supersedes mine, but must in turn give place to Westerlund's, that is, of course, assuming that the shells are identical, as they seem to be. The fact of Mr. Mason's Mortlake examples constituting the first record of the occurrence of this beautiful form, as British, yet brought before the society, is very interesting—and perhaps quite as important as the institution of a new "variety."—R. STANDEN (*Read before the Society*, Nov. 8th, 1899).

ADDITIONS TO "BRITISH CONCHOLOGY."

By J. T. MARSHALL.

(Continued from page 296).

O. rufa Phil.—Brodick Bay, 40 f., and Sound of Sleat, 50 f. (Somerville and J.T.M.); Loch Linnhe, 24 f. (Knight)! Milford Haven, 10 f.; Cumbrae; Kyles of Bute, 18 f.; Oban; Loch Fyne; Loch Broom, 20 f.; the Minch, 40 f.; E. Shetlands, 35 f.

Var. **fulvocincta** F. & H.—18 to 90 f. Sound of Sleat, 30-90 f. (Somerville and J.T.M.); Tenby; Portmarnock; Doggerbank; Cumbrae, 18 f.; Oban, 16-25 f.; Loch Broom, 20 f.; the Minch, 40 f. At all the Scotch localities the type and variety were dredged together.

Although generally speaking the type is southern and the variety northern, they are by no means exclusively so, the two forms being found together in many parts of the north, and at various depths, as the preceding records show. The variety merges from the type through every degree of slenderness. It never attains the size of the latter, and the degree of convexity in the whorls is so variable that the only character by which it can be separated from it, when dead, is its comparative slenderness; when fresh, the ground-work of the shell is paler and the band darker; even so, some specimens may be ascribed to either. A whitish form, with or without bands, is sometimes met with, and dead specimens become white; one of these latter, "found on the sands near Dunbar," is *O. crenatus* Brown.

Jeffreys long ago pointed out [1] that "Totten's specific name (*interrupta*) is prior to that of Philippi, and ought to be adopted," but he himself, and subsequent writers, prefer for some reason to retain Philippi's well-known name.

O. (Turbonilla) multilirata Monterosato.—"Similar to *O. pusilla*, but adorned with granular spiral striæ. Palermo, 60-90 metres" (Monterosato). This is new to the British seas. It may be known from the next species (*O. verticalis*) which it most nearly resembles, by the microscopical spiral striæ which traverse the whole shell, ribs and interstices alike, though these striæ are more readily observable between the ribs, where they may be seen with an ordinary lens. The embryonic apex is larger and more exposed than in any of the allied species, and lies in a horizontal position on the top of the spire. I have one specimen only from the Atlantic side of the Scilly Islands, in 40 fathoms, which was on the same ground as yielded other rare Mediterranean species (*Tellina serrata* and *Rissoa subsoluta*) which I have already recorded. My Scillonian specimen is nearly a quarter-

1 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.*, 1884, p. 356.

inch in length by $\frac{1}{12}$th inch in breadth, and is much larger, coarser, and more conical than any I have seen from the Mediterranean. In addition to Monterosato's record, I can add the Algerine coast 51 f. and Adventure Bank 92 f. ("Porcupine"). (In this connection I may mention the recent discovery on the same ground of *Rissoa hispidula* Monter. =*R. clathrata* Phil., another Mediterranean shell, and I venture to predict that more Mediterranean species will be met with in the same quarter).

O. verticalis Marsh. n. sp.—Shell forming an attenuated cone, rather solid, and somewhat glossy; sculpture consisting of straight, broad, and blunt longitudinal ribs throughout its whole length; these ribs are wider than their interstices, and number sixteen on the last whorl, disappearing just below the periphery, the base being smooth; colour white; whorls seven (besides the embryonic ones), compressed but not flat, the last occupying a little more than a third of the length; spire produced and tapering to a blunt point, which represents the embryonic whorls; these are exposed and inverted horizontally at the apex; suture rather shallow, and nearly straight; mouth oval, acute-angled above, gently curved at the outer edge, and rounded below; outer lip thin, and slightly flexuous and projecting; inner lip reflected on the pillar, which is sloping; there is no umbilicus nor chink, and no tooth outwardly visible. L. 0·2 in, b. 0·06. One specimen from Bantry Bay.

This shell is regularly conical, and not cylindrical in any part. It is quite distinct from any of the abnormal forms of those species in this section which have straight ribs, and with which I have compared it. It resembles most an *O. lactea* with straight ribs, but the whorls are individually longer than in that species or any of its congeners, they are more compressed, and the apex is broader and blunter. As there are many Bantry Bay shells in existing collections, I hope that by this means more specimens may be brought to light.

O. lactea L.—Not a variable shell as regards shape, but only as regards the disposition of the longitudinal ribs. It can always be separated from *O. pusilla* and *O. innovata* by the termination of the ribs, which extend lower down the base and end abruptly; in the other species they gradually evanesce from the periphery. The spire is occasionally curved, though mostly the result of accident. It is most abundant in the Channel Islands, but becomes gradually scarcer as it approaches the northern coasts. A pretty *Scalaria*-like example from Jersey has a deeply-channelled suture and unusually oblique ribs.

The var. *paullula* of Jeffreys is a conchological Mrs. Harris—"there's no sich a person!" What Jeffreys meant for such was *O. pusilla* var. *minuscula* Marsh., the *O. pusilla* of Philippi being unknown to Jeffreys as a British species.

O. pusilla Phil. (*non* Jeffr.)—L. 0·25 in.; b. 0·06; whorls 9-10. Muddy sand in shallow water. Scilly Islands (Burkill and J.T.M.); Channel Islands; Land's End, Falmouth, and Fowey; Plymouth Sound, 16 f.; Borough Island, Torbay, Babbacombe Bay, and Exmouth; Caldy and Tenby; Southport; Connemara, Mayo, and Sligo; Portmarnock; Loch Inver, 25 f. Fossil in the Belfast clays (Praeger)!

Var. **grossa** Monter. (*J. Conch.*, vol. 7, p. 384, 1894).—L. 0·25; b. 0·08 in. Torbay, Gairloch, Loch Inver, and Stornoway. Judging from Jeffreys' description and figure of *O. sinuosa*,[1] and after examining other specimens from the same dredging station, I consider that shell to belong to this variety, and that his specimen was not quite mature.

Var. **cylindrata** Marsh. (*J. Conch.*, vol. 7, p. 255, 1893).—L. 0·20; b. 0·04 in. Jersey, Mount's Bay, Torbay, Tenby, Southport, Aberdovey, Bantry Bay, Connemara, Mayo, Sligo, and Dornoch Frith.

Var. **minuscula** Marsh. (*J. Conch.*, vol. 6, p. 347, 1891).—L. 0·1; b. 0·03 in. Many places on the English, Welsh, and Irish coasts.

This species appears to be most prolific in Babbacombe and Teignmouth Bays. Very rarely it has straight ribs—corresponding to similar forms of *O. lactea* and *O. innovata*—three instances in several hundred specimens. The tooth-like fold is usually observable in this and the next species, but less so in the last, and the three occasionally exhibit the same peculiarity of sculpture that I have noticed in *O. indistincta* and *O. interstincta*, the last whorl having finer and more numerous ribs than the rest of the shell.

Sowerby's figure (pl. xvi., fig. 3) is meant for this species, but it should be larger, less compressed, the ribs oblique, and the sutural lines deeper.

O. innovata Monter. (=*O. pusilla* Jeffr.)—Channel and Scilly Islands, Penzance, Borough Island, Torbay, and Freshwater West. Whorls 9-10.

Var. **nana** Marsh. (*J. Conch.*, vol. 7, p. 385, 1894).—L. 0·1; b. 0·03 in. Guernsey, 20 f.

A scarce species, and rare in a living state. The last whorl is proportionally shorter than in *O. lactea* or *O. pusilla*. This and the last two species, with their varieties, will be found more fully dealt with in *J. Conch.*, vol. 7, pp. 382-5, 1894.

O. delicata Monter. (*J. Conch.*, vol. 7. p, 255, 1893).—Bundoran, in Donegal Bay ("Porcupine"). I have it also from the same locality,

1 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.*, 1884, p. 358, pl. xxvii., f. 1, one specimen.

and from Roundstone and Killala Bays, in the west of Ireland. There are two sizes, a dwarf form being less than half that of the type. It is well figured in Sowerby's "Index" under the name of *Chemnitzia simillimus*, Mont., but Montagu's species of that name was stated by the author to be less slender than *O. lactea*, with less numerous ribs, and was most probably a worn *O. rufa*, as suggested by Jeffreys. However, that figure (fig. 2, pl. xvi.) was no doubt meant originally for the supposed *O. lactea* var. *paullula* (=*O. pusilla* var. *minuscula*) but was unquestionably drawn from an *O. delicata*, being more slender, with more numerous whorls and finer sculpture. It is "characterised by the ribs being exquisitely dentellated at the suture, as in some *Scalariæ*" (Monterosato).

O. scillæ Scac.—Isle of Man (L.M.B.A.)! Liverpool Bay (Tomlin); Lynn of Morven, 40 f. (Knight)! East Sutherlandshire, from stomachs of haddocks (Baillie)! Gairloch, 30 f.; Sound of Sleat, 40-90 f.; Loch Inver, 25 f.; and Loch Broom, 30-50 f. (Somerville and J.T.M.); Carradale, 23 f.; Campbelltown Loch, 23 f.; Machrie Bay, 25 f.; Otterard Rock, 20 f.; and Mull of Cantire, 24 f. and 55 f. (Knight)! Scilly, 40 f.; Brodick Bay, 40 f.; Kyles of Bute, 14 f.; Clyde, 18 f.; Cumbrae, 16 f.; Arran, 12 f.; the Minch, 40 f. Also the Atlantic off Scilly, 690 f. ("Porcupine")!

This varies in the degree of compression and in the angularity of the base, but it is a most distinctive shell, and can cause no difficulty in identification. The first two regular whorls are convex and less compact than the rest, as in some species of *Eulima*. According to Monterosato, *Eulimella pyramidata* Desh. (1832) has priority of *E. scillæ* Scac. (1836).

O. compactilis Jeffr. (*J. Conch.*, vol. 7, p. 255, 1893).—Off Menavawr, Scilly, 40 f. It was also dredged by the "Porcupine" in 1869 in the Atlantic off Scilly, 690 f., and in 1870 from three stations in the Atlantic off Ireland, but only one specimen from each station. This seems to be everywhere rare. Sowerby gives a figure of it in his Supplementary Plates, but it is indistinguishable. His figure of *O. acicula* (fig. 27, pl. xvi.) would suit it in dimensions and profile, but the apex should be blunt.

O. acicula Phil.—Sparingly distributed on all the British coasts, from 10 f. (Torbay) to 90 f. (Sound of Sleat).

Var. **turris** Forb.—Scilly 40 f. (Burkill and J.T.M.); Eddystone, 30 f.; Guernsey, 20 f. This is smaller than the type, and although a very narrow shell, the whorls progressively increase to the base, the last always being the largest. It is figured (fig. 30, pl. xiv.) in Sowerby's "Index," erroneously as var. *obeliscus*, but was unquestionably meant for this, and should have nine whorls instead of six.

Var. **obeliscus** Jeffr.—Guernsey, 18 f.; Scilly, 40 f.; Eddystone, 30 f.; Glenelg, 30-60 f.; the Minch, 50 f. This is a rare form in Britain. It resembles *Eulima* in the flattening of the whorls and fine sutural lines. Plenty of typical specimens equally resemble *Eulima* in these respects, but this is a small and slender cylinder. Jeffreys' original figure[1] is not compressed enough, but more nearly represents a half-grown type shell. It is less rare in extra-British waters as *Eulimella subcylindrata* Dunk. (1862).

O. acicula is one of the most variable species of the genus, embracing every variation of shape, size, and compression. Out of one hundred specimens taken haphazard, not more than twenty will be found to conform to the type. Some have a shallow suture and angulated base, and look like a slender *O. scillæ*. Many are obtusely keeled, and some have the top whorls abruptly ending as in *O. innovata*. Others (from Guernsey and Scilly especially) have the whorls as rounded as *O. ventricosa*, and give some trouble in differentiating from that species. A good microscopic character, when the shells are fresh, is that *O. ventricosa* is quite smooth, while *O. acicula* is spirally striated throughout, as in *O. scillæ* and *O. nitidissima*, and these striæ can be seen with a Coddington lens. Extra-British forms of both species are much more distinct. A slender dwarf variety peculiar to Guernsey is distinct from any of the named varieties, and another from Scilly, more slender still, is equally distinct. I have besides eight other varietal forms from various parts of the British coasts. The largest come from Guernsey and the Shetlands, and measure two lines by one-half, and it is more plentiful in the former district than elsewhere. I have several deep-water specimens from the Mediterranean which are very deceptive in having all the appearances of a ribbed shell. These ribs are broad and flat, with interstices of the same width, and are continued with great regularity sometimes throughout the entire spire or on the lower whorls only; but these ribs are caused by frequent and methodical starts of growth of the animal, which alter the whole aspect of the shell, and make them resemble *Turbonillæ* rather than *Eulimellæ*.

Jeffreys' figure is a good one, but perhaps too slender in proportion to length. Forbes and Hanley give two figures, both of which are too broad at the base. Sowerby's is unlike; it represents a conical shell with a sharp apex, and the dimensions are too small.

Monterosato [2] substitutes *E. commutata* for this species, on the ground that *Auricula acicula* Lamk.=*O. acicula* Desh., are *Eulimellæ* of the Paris basin; but *vide* Jeffreys [3] on this point.

1 *Ann. Mag. Nat. Hist.*, ser. 3, vol. 1, p. 46, pl. ii., f. 5, 1858.
2 Nomenclatura Gen. e Sp. Conch. Med., p. 98.
3 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.*, 1884, p. 362.

O. ventricosa Forb. (*J. Conch.*, vol. 7, p. 255-6, 1893).—Fine sandy mud, 15-80 f., from Jersey to Shetland.

This is not a satisfactory species, some forms being difficult to separate from the last, but usually this is thinner, more conical, and the whorls more convex, while in *O. acicula* the upper whorls are more rapidly formed and the lower ones are uniform in width, imparting a cylindrical outline; but it must be noted that these characters are occasionally reversed, some specimens of *O. acicula* having also convex whorls, especially on the lower half, while others of *O. ventricosa* have a cylindrical outline, with the whorls more or less compressed, either in the middle or on the upper part only of each whorl, or they are compressed throughout. Sowerby's figure of *O. acicula* represents one of these compressed *O. ventricosa*. The best typical specimens are dredged in the sheltered lochs of the Hebrides; these are very thin and polished, nearly transparent, regularly conical, and easily separable from *O. acicula*; but some difficulty will be experienced especially with those from the Channel and Scilly Islands, which are more solid, cylindrical, and compressed, these characters interchanging in a most perplexing manner with *O. acicula*. It is more local than that species, but comparatively plentiful in some parts of the Hebrides. Both Jeffreys' and Sowerby's figures are very good, though the latter has too many whorls.

O. nitidissima Mont.—Fine sand, 5-45 f. Scilly Islands (Burkill and J.T.M.); off Millport, Cumbrae (Knight)! Dornoch Frith (Baillie and J.T.M.); Jersey and Sark; the Minch 40 f.; Orkneys, 45 f. Fossil in the Belfast deposit (Praeger)!

It is remarkable that this species, whose extreme slenderness is its most striking feature, should also possess a broader as well as a more slender relative; the latter, which is hardly more than half the width of the type, sparingly occurs almost everywhere with it, but those from the west of Ireland coasts all belong to the slender form. A rare form has compressed whorls and a shallower suture, and a monstrosity has the whorls carinated. Living specimens are yellowish-brown. Sowerby's good figure is the type form; Jeffreys', equally good, is the Irish or slender one. Specimens without the microscopical spiral striæ occasionally occur on the British coasts; this is *O. pointeli* De Folin=*O. nitidissima* var. *pura* Monts.

A specimen of *O. nitens* Jeffr. was dredged by the "Triton" in the Shetland-Færœ Channel, 570 f.!

O. fallax Monter. (*Bull. Mall. Ital.*, p. 70, 1880)=*O. suboblonga* Jeffr. (*Proc. Zool. Soc.*, p. 345, pl. xxvi., f. 3, 1884).—I detected a specimen of this shell among some of the dredgings of the Royal Irish Academy cruise of 1886 off S.W. Ireland, from 48 f. It was also

dredged by the "Porcupine" in the same region in 251 f., in the Atlantic off Scilly in 539 f., and some other parts of the Atlantic and Mediterranean. This is very like a stumpy *O. conoïdea*, having the same apex, keel, and texture, and, like that species, varying in the convexity of the whorls and occasional absence of the basal keel, but the aperture is never grooved. Although Jeffreys says it has no umbilicus or chink, there is frequently a small but distinct perforation. Jeffreys' figure in the "Lightning" Report is a very good one, but the shell embraces a certain amount of variation. Should more specimens be dredged hereafter within sight of our coasts, it will make an interesting addition to the British list.

O. lactoïdes Monts. which has been recorded by me from the English Channel[1] I now find on further examination to be *O. magnifica* Seg. This handsome shell possesses "a character common and peculiar to all the specimens (European, American, and Fossil) which I have examined, viz., the close striation length-wise by delicate and microscopical lines which cover the whole of the shell. These striæ are not mere marks of growth, but a distinct kind of sculpture."[2] Gwyn Jeffreys, however, has failed to notice that this is a character also shared by *O. compressa* Jeffr. and *O. paucistriata* Jeffr.

Ianthina rotundata Leach.—There is no authentic record of this or of any other species of *Ianthina* having been taken alive in our seas; but Miss Hockin, of Hayle, many years ago sent me baby specimens of this species which she found there "washing in alive in the January following the November in which she found large ones," and she thinks they "first lived [were born] in these waters." Certainly, adult *Ianthinæ* are never wafted to these shores in January, but always in the latter half of the year.

A fleet of *I. communis* were cast ashore at Islay in summer 1883.

Stilifer turtoni Brod.—Aberdeenshire (Simpson)! Land's End; Falmouth; Fowey; Eddystone.

This species has a considerable range of variation in shape and proportions, but there are two principal forms, which may indicate the sexes—one similar to that figured by Sowerby and Jeffreys, which is the type; the other, not quite so numerous, which is more or less oblong, in consequence of the spire being longer and the body-whorl smaller. The stiliform apex is not always erect as depicted in the figures, but declining at various angles, and in some cases prostrate. Keeled striæ often encircle the body-whorl, especially the lower half, and it is also occasionally malleated. Outlines of the extreme forms will be found in *J. Conch.*, vol. 8, p. 176, 1896.

1 *J. Conch.*, vol. viii, p. 433, 1897.

2 Moll. "Lightning" and "Porcupine," *Proc. Zool. Soc.*, 1884, p. 357.

(To be continued).

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"Note on *Petricola denticulata* Sby.," by W. H. DALL [*P. tellimyalis* is young of this species]. "Description of a new Californian land shell [*Epiphragmophora bowersi*"], by F. W. BRYANT. "The corrosion of shells in cabinets" [reprinted from the *Journal of Conchology.*] "Note on the varieties of *Epiphragmophora mormonum* [varr. *buttoni* and *calla* nn.]," by H. A. PILSBRY. "A new *Calliostoma* [*C. veliei*] from Florida," by H. A. PILSBRY.

"The genuine *Planorbis corpulentus* Say," [description, figures, and bibliography], by BRYANT WALKER. "New southern Unios" [*U. kingii*, Baker Co., Georgia], by B. H. WRIGHT. "Notes on some southern Mexican shells" [*Chondropoma martensianum*, *Unio* (*Lampsilis*) *rovirosai*, Tabasco, Mexico, nn. spp.], by H. A. PILSBRY. "Some notes on the land shells of Western Florida," by C. W. JOHNSON. "*Epiphragmophora harperi*, n.sp." [San Jacinta Mts., California], by F. W. BRYANT. "A new N.E. Australian Amnicoloid" [*Petterdiana thaanumi*], by H. A. PILSBRY.

"Notes on *Saxidomi* of the west coast," by R. E. C. STEARNS. "A new species of *Sistrum*" [*S. nicocheanum*, Argentina], by H. A. PILSBRY. "A new Guatemalan *Glandina*" [*G. iheringi*, Guatemala], by H. A. PILSBRY. "New *Pisidia*" [*P. imbecile*, *P. peraltum*, nn. spp., Michigan], by Dr. V. STERKI. "J. B. Quintard" [obituary notice]. "Note on *Vitrea rhoadsi* Pils." [extended distribution], by BRYANT WALKER. "Note on the habits of *Limnæa mighelsi* W. G. Binn." [large numbers in Crystal Lake, Mich.], by BRYANT WALKER. "The growth of land snails," by JENNIE M. H. MORRELL. "Land shells from rejectamenta of the Rio Grande at Mesilla, New Mexico, and of the Gallinas River at Las Vegas, N.M." [supplementary list of species], by H. A. PILSBRY. "Notices of some new Japanese mollusks" [*Æulota horrida*, *E. mesogonia*, *Ganesella jacobii*, *Cyclotus* (?) *micron*, *Fomatias hirasei*, nn. spp.], by H. A. PILSBRY.

The Irish Naturalist, vol. 9, nos. 4 and 5, April and May, 1900.

"*Arion empiricorum* var. *bocagei*" [discussion of name and characters], by W. E. COLLINGE, J. W. TAYLOR, and R. F. SCHARFF. "Some new varieties of Irish land mollusca" [*Succinea pfeifferi* var. *reticula*, *Clausilia bidentata* var. *variostriata* Westerlund].

Science Gossip, vol. 6, no. 71, April, 1900.

"Rearing snails in captivity" [habits of *Helix pomatia* and *Bulimus oblongus*], by ELEONORA ARMITAGE.

Annals of Scottish Natural History, no. 34, April, 1900.

"*Sepiola rondeleti* in the Firth of Forth," by ROBERT GODFREY. "*Limnæa stagnalis* in West Lothian," by ROBERT GODFREY.

La Feuille des Jeunes Naturalistes, nos. 354 and 355, April and May, 1900.

"Liste des coquilles marine, terrestres et d'eau douce, recueillies aux environs de Cancale," by H. MARTEL.

"List of shells collected by Vernon Bailey in Heron and Eagle Lakes, Minnesota, with notes" [18 spp., enumeration of forms of *Limnæa emarginata* Say], by R. E. C. STEARNS. (*Proc. U.S. Nat. Mus.*, vol. 22, no. 1190, p. 135-138).

"Description of a new variety of Haliotis from California, with faunal and geographical notes" [*H. fulgens* var. *walallensis*], by R. E. C. STEARNS. (*Proc. U.S. Nat. Mus.*, vol. 22, no. 1191, p. 139-142).

"A Report upon the Mollusca (excluding the Cephalopoda and Nudibranchiata) obtained by the Royal Irish Academy Cruises of 1885, 1886, and 1888," by G. W. CHASTER [a valuable list with localities and notes on distribution and nomenclature; *Spiralina*, n.g. for *Turbo spiralis* Montagu; *Jordaniella*, n.g. for *Turbo nivosa* Montagu].

Paludestrina jenkinsi Smith **at Droylsden, Lancashire.**—On the 6th of May last, I searched the canal at Droylsden for shells. In the vicinity of the tunnel at "Daisy Nook," Waterhouses, I had little success, molluscan life being almost absent, owing, probably, to the lack of aquatic vegetation and the stony character of the canal bottom. On walking along the towing path in the direction of the Droylsden cotton mills, I noticed a promising patch of the "water moss" (*Fontinalis antipyretica*) and upon passing my scoop through this I was surprised to find some specimens of the carinated form of *Paludestrina jenkinsi*. The shells increased in numbers as I advanced, and between the bridge (over which crosses the roadway leading to Littlemoss) and the first cotton mill, they swarmed on the stony bottom of the canal; but near the mill, where the hot water from the engines is turned into the canal, I obtained but few specimens. I carefully examined the sides of the canal, the walls, and roots of grass growing in the shallow water without finding a single specimen in either case. A few weeks later I made another thorough search in the same locality and found that a considerable change had taken place in the habits of *P. jenkinsi*. They were now to be found in great abundance on the aquatic vegetation and roots of grass, where they had doubtless gone to deposit their young, for on washing the shells under the water-tap at home, the mollusks became very active and deposited hundreds of young in the shallow basin in which they were placed. The adult shells vary much in size and degree of carination. Fully 80 per cent are the carinated form. I cleaned out the animals from over 300 shells of the various forms, taken in June and July, and found that every individual contained young. If, as I believe it is generally understood, the sexes are separate in *Paludestrina*, I should like to know what becomes of the males? I cannot offer any opinion as to how this species has been introduced into the Droylsden canal. Very little, if any, timber is brought up here, the boats being engaged in the coal and cotton traffic, so "Baltic timber" can hardly be the solution of the mystery of its introduction, which must have been quite recent, for this particular portion of the canal was, up to two years ago, the favourite hunting ground of Manchester conchologists, and it hardly seems possible they could have overlooked the shell.—FRED TAYLOR (*Read before the Society*, Nov. 8th, 1899).

ON THE FORMS OF LACUNA PUTEOLUS (TURTON).

By L. St. G. BYNE, M.Sc.

(Read before the Society, May 5th, 1900).

During the ten years that my father, the late Mr. Henry Byne, and myself worked at the marine mollusca of the Bay of Teignmouth, South Devon, we had excellent opportunities of studying this variable species in all its forms. We examined many thousands of specimens. The species occurred in great profusion amongst seaweeds on rocks at low water throughout the bay; the rare variety *expansa* being fairly abundant. I propose in these notes to offer some observations upon the forms of this species that I have met with at Teignmouth and neighbourhood, also describing new ones.

Forms.

I.—Typical.

(*a*). Banded. This is the prevailing modification.

(*b*). Light-horn coloured. This has also occurred as a thin transparent form with slight purple bands, and also stained with carmine. This latter may be due to some secretion of the animal. Some examples are greenish-brown in hue.

(*c*). Whorls coloured a purplish-brown with a yellow band near the apex. This variety is quite constant, and I have about fifty examples. There are those who would give this a varietal name, but I do not propose to do so. I have been and am still greatly against burdening our list with slight varieties in colour or form.

(*d*). Horn coloured with a deep purplish band around the base of the body-whorl. Two specimens only among thousands of ordinary form.

(*e*). Horn coloured with a thin red line or band around the body-whorl. A few only.

I am glad to note that Mr. Marshall has withdrawn his variety *plicata* from the list. I quite concur in his opinion that it is not a valid variety, the lines being worn by attrition.

II.—Var. **expansa** Jeffreys occurred mixed with the type. In one instance, however, it was accompanied by large *L. divaricata*. I have noticed several modifications.

(*a*). Light-horn coloured.

(*b*). Banded.

(*c*). Plum coloured. I am indebted to the late Mr. Burkill for examples of this and the next form from Penzance.

(*d*). Milk-white. Penzance.

It is quite possible with large quantities of the species to form a series, beginning with the type and ending with this variety. Many intermediate stages can be picked out. I possess an example of this variety with the umbilicus almost obliterated.

III.—Var. **clausa** Jeffreys may be either banded or horn coloured. I have made long observations upon this variety, but cannot bring myself to believe in its validity. In my opinion it is only a monstrosity. I have this form in all stages, from the type to specimens with the umbilicus totally eradicated. I venture to suggest that this variety be expunged from the British list.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

289th Meeting, April 11th, 1900.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted:

The usual periodicals received in exchange.

Further Donations to the Fund for clearing off adverse balance announced and thanks voted:

	£	s.	d.
T. Godlee	1	1	0
Kenneth McKean	0	10	0
Chas. Oldham	1	1	0
C. H. C. Hibbert	0	10	6
J. Ponsonby	1	1	0
TOTAL	£4	3	6

Candidate Proposed for Membership.

Miss M. V. Lebour.

Paper Read:

"Edgar Leopold Layard, C.M.G., F.Z.S., etc.," by Edward Collier.

Exhibits.

By Mr. Thomas Rogers: *Vitrina etheredgei* Hedley, *Helicarion hillei* Cox, *Microcystis catletti* Pfr., and *Endodonta waterhousei* Hedley, from Lord Howe Is.

By Mr. R. Cairns: A large series of *Helix trailli* showing extensive variation.

A fine series of *Partula* was shown by Messrs. J. Cosmo Melvill, R. Cairns, R. Standen, T. Rogers, W. H. Heathcote, and the Manchester Museum, including about eighty of the known species, and many varieties. A fine series of *Diplomorpha layardi* and *D. delatouri*, showing the red and white-lipped forms of the former and the type, and the large "mountain form" of the latter, were also exhibited. The opinion was expressed that *Diplomorpha* is a connecting link between *Partula* and *Placostylus*.

290th Meeting, May 5th, 1900.

Held by the invitation of Mr. J. Cosmo Melvill at Brook House, Prestwich.

Mr. E. R. Sykes, President, in the chair.

Donations to the Library announced and thanks voted:

Mollusca of the Royal Irish Academy Cruise, by G. W. Chaster (*from the author*); and the usual periodicals received in exchange.

Further Donations to the Fund for clearing off adverse balance announced and thanks voted:

	£	s.	d.
R. Bullen Newton	0	10	6
Bartlet Span	0	5	0
Thos. Edwards	0	2	6
Bryant Walker	0	10	0
A. Hann	0	5	0
J. Linton	0	2	6
G. F. Tregelles	0	5	0
Jas. J. Macandrew...	1	1	0
Mrs. L. A. Smith (second donation)	1	1	0
J. Farquhar...	0	10	6
D. D. Baldwin	0	15	0
T. Hey	0	5	0
A. Hartley	0	10	0
TOTAL	£6	3	0

New Member Elected.

Miss M. V. Lebour, Radcliffe House, Corbridge-on-Tyne.

Candidate Proposed for Membership.

Miss Jessie Reeve.

Annual Meeting.

It was announced that the Annual Meeting would be held at the Manchester Museum, Owens College, on October 27th, 1900, and that there would be no meetings in July and August.

Papers Read.

"Lovell Reeve: a brief sketch of his life and career, with a fragment of an Autobiography, excerpts from his Diary (1849), and Correspondence," by J. Cosmo Melvill.

"On the forms of *Lacuna puteolus* (Turton)," by L. St. George Byne.

After the President had suitably expressed the acknowledgments of the meeting to Mr. Melvill for his hospitable reception, an adjournment was made for tea, and thereafter for the inspection of the cabinets containing Mr. Melvill's collection.

Helix virgata in Staffordshire.—A specimen of this species was reported to me as having been found in Staffordshire as long ago as 1889, but on examination it proved to be a very young *H. itala*. Since then I have been on the constant look-out for *H. virgata* in our county and it has at last been reported to me as found at Wren's Nest, near Dudley, in 1894, by Messrs. A. Wood and H. Overton, of Sutton Coldfield. At my request Mr. Wood has recently visited the locality again and forwarded to me a number of living specimens. These I submitted to Mr. T. Rogers, the Referee of our Society, and he reports that he does not consider them to be quite typical, I, therefore, take the opportunity of exhibiting the shells for the examination of members. Some of them appear to me to be of a small typical form. Mr. Wood is of opinion that this colony of *H. virgata* has been introduced, as it only covers an area of about 20 square yards and the species is not found elsewhere in the vicinity. May I take this opportunity of asking conchologists to kindly supply me with any notes on Staffordshire mollusca or any references to the Bibliography of the subject, as I am now engaged in revising our county list.—JOHN R. B. MASEFIELD, Rosehill, Cheadle, Staffordshire, 20th October, 1899 (*Read before the Society*, Nov. 8th, 1899).

LOVELL REEVE: A BRIEF SKETCH OF HIS LIFE AND CAREER,

WITH A FRAGMENT OF AN AUTOBIOGRAPHY, EXCERPTS FROM HIS DIARY (1849), AND CORRESPONDENCE.

By JAMES COSMO MELVILL, M.A., F.L.S.

(Read before the Society, May 5th, 1900).

Having always felt a great admiration for the subject of the following notes, I regret that I can only recollect two or three occasions when I had the pleasure of seeing him. One of these was during the famous sale of the collection of shells formed by Mr. John Denpool, April 21—nison, of Liver-26, 1865, which was attended by all the principal votaries of the science. On this occasion were to be seen Messrs. Hugh Cuming, T. Lombe Taylor, of Starston Hall, John Miers, F.R.S., and his daughter, Messrs. Henry and Arthur Adams, Sir D. Barclay, Bart., Mr. G. F. Angas, the Messrs. Sower-by, and many others at that time famous in conchological circles. Somewhat late in the morning of the third day of the sale,[1] Mr. Lovell Reeve, who was even then suffering from the illness which seven months later terminated his useful life so prematurely, was wheeled in, in a bath chair, immediately to become surrounded with his friends; very soon one of the prizes of this famous collection, the most perfect *Conus gloria maris* known, was put up for public competition, and it eventually fell to him at a high figure, very shortly afterwards to find its permanent home in the Australian Museum at Sydney.

LOVELL REEVE.

Some few years ago I made the acquaintance of Miss Jessie Reeve at Folkestone and found she was in possession of some very interesting, if somewhat fragmentary, memoranda belonging to her father. All

1 Mr. Reeve's private collection had been sold also at Steven's Auction Rooms two years previously.

the material in her possession, the publication of which is likely to be interesting now to conchologists, she very kindly forwarded to me after having taken especial trouble to read through a voluminous diary, and cull therefrom certain extracts bearing upon his favourite study, for which I am very much indebted to her.

These excerpts I purpose to print a little later on, together with one or two letters, which may be interesting, as giving his views upon two meetings he attended of the British Association, viz.: at Southampton, in 1846, and Birmingham in 1849. Meanwhile it will be well to give a slight sketch of the career and labours of one who, living, fortunately for himself, during the very hey-day of acute systematic research, applied himself so steadfastly and earnestly to his work, that it is to be feared he early overtaxed his health and strength.

A serial, edited by him, entitled 'Portraits of Men of Eminence in Literature, Science and Art,' contained in the number for December, 1865, a sketch of his career, written by a friend immediately after his decease. For some of the facts here given I would express my indebtedness to this account.

Lovell Augustus Reeve, born at Ludgate Hill, on April 19th, 1814, was the son of Mr. Thomas Reeve, draper and mercer in the City of London, who was brother-in-law of Alderman Waithman, M.P.,[1] they having married sisters. It is somewhat melancholy reading to find that though young Reeve distinguished himself very praiseworthily at school, having obtained in eight terms as many prizes for proficiency in Greek and Latin, he was, notwithstanding, removed at the early age of thirteen from academic influence, and at once bound apprentice to a grocer at Ludgate Hill. It is not difficult to forsee that had he been granted a Public-school and University career he would have obtained unusual distinction. Senior classics or Wranglers have been formed before now out of less promising material! But it is a depressing sight to contemplate, in imagination, a boy with this refined and classic mind set down to weigh out a pound of molasses or dispense a packet of tea. Still the silver lining that proverbially belongs to every cloud made its appearance in the grocer's shop in the shape of a sailor who entered "with a pocket handkerchief full of shells," perhaps to barter them for produce, but this is not clear. To say that they soon became the property of the young enthusiast, is perhaps superfluous. Having acquired these, he at once became a staunch devotee of conchology, the serious study of which had hardly before been more than attempted. A friend, alluded to in the autobio-

1 Subsequently first Sheriff, then Lord Mayor of London. M.P. also for the City of London during four successive Parliaments. The granite obelisk at the foot of Ludgate Hill perpetuates his memory.

graphical extract as G.W.,[1] a compositor in Messrs. Spottiswoode's printing office, became his close friend and ally, and together they scanned the shops and sailors' quarters surrounding the Docks, in search of possible trophies, and occasionally their zeal was well rewarded.

A little later he formed the acquaintance of Dr. John Edward Gray, of the British Museum, and, in 1833, attended the meeting of the British Association, then in its infancy, at Cambridge, Prof. Adam Sedgwick, F.R.S., the eminent geologist, being president for the year. Here he widened his knowledge of and acquaintance with both men and mollusca, and was appointed chief of an exploring excursion made to Wicken Fen and the Ely Marshes, whose solitary inn, still existing, with the sign "Five Miles from anywhere," bears the best testimony to the solitude of what, at all events then, was a 'terra incognita,' where men, women and children worked in agricultural gangs almost like slaves in the partially reclaimed fen. Here rare plants such as the *Senecio paludosus*, *S. palustris*, and the scarce orchid *Liparis Loeselii* were seen but by few, while the large Copper Butterfly (*L. dispar*), now long since extinct, and the Swallowtail (*P. machaon*), with many a rare moth, frequently eluded their pursuers on the treacherous wastes they inhabited. Many fluviatile mollusca, especially *Planorbis* and *Sphæria*, likewise abounded, and still do as I can personally testify, at Wicken,[2] and no doubt Reeve exhaustively studied these during this excursion.

A few years afterwards, in Paris, he read a paper on the Classification of the Mollusca. This was his first scientific contribution, very closely, however, followed by the more ambitious 'Conchologia Systematica," in two quarto volumes, published 1840-41, by Longman & Co., with 300 plates. To meet the large expense of this work he applied the whole of the fortune left him by his father, viz.:—The ninth share of a reversionary interest in an estate on Ludgate Hill.

It was now very evident that scientific studies had taken so much hold on him as to unfit him from pursuing any calling in which they had no share; and it was therefore more than fortunate that Reeve was enabled through his knowledge of mollusca, to make a wonderful bargain in the purchase and re-sale of the von Ryder shells at Rotterdam. These had been procured in the East Indies, mostly in the Moluccas or Spice Islands, by the General of that name, and were

1 George Walker. *Cypræa Walkeri* Reeve was named in his honour.

2 This interesting relic of fen-land is now on the market, and there exist grave fears on the part of zoologists and botanists alike, that unless steps are taken with a view to preserve them as a happy hunting-ground of the future in their pristine condition, the whole will at no distant date be reclaimed.

sold in ignorance of their value. It was at this sale that the two *C. gloria maris* were procured, which eventually found their way into the de Burgh and Lombe Taylor Museums. Having thus become a capitalist on a small scale, and having a great desire, as fervent as laudable, to illustrate in a permanent manner all molluscan species, Reeve first started an emporium in King William Street, Strand, for the sale of specimens and the publication of works.[1] It was here that in 1843, he began the most ambitious work of his life, entitled "Conchologia Iconica." It consisted of a series of monographs, each devoted to a single genus, and the first fifteen volumes were produced under the eye of the editor, who wrote all the descriptions,[2] the illustrations being drawn by Mr. G. B. Sowerby, Sen., the last five volumes were not only illustrated by Sowerby, but the descriptions were likewise written by him after Reeve's death.

The shells selected for figuring were the finest examples then procurable, and the series started with the genus Conus, a frontispiece being devoted to *C. gloria maris*. Besides his own collection specimens were chiefly selected from the Cuming, Saul, and Stainforth collections. The first of these is now incorporated in the British Museum, the second, especially good in *Cypræa* and *Murex*, is at Cambridge, the third was dispersed by auction nearly fifty years ago, but it is still known where many of its types are located.

It has lately become the custom, in certain circles, to sneer at many of the authors who flourished about the period of which we are treating,[3] inasmuch as in most cases, anatomical details are not sufficiently considered. Doubtless the 'Conchologia' is not so much a work for the malacologist as the conchologist, but that Reeve did not neglect this important side of the science is shown by the publication, in 1850, of "The Elements of Conchology, an Introduction to the Natural History of Shells, and of the Animals which inhabit them."

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1 The publishing house thus started earned an enviable notoriety by the issue of many a natural history work of excellence, and has been recently converted into a limited company. It has been located for years at Henrietta Street, Covent Garden; but we believe we are correct in stating that the descendants of Mr. Reeve have now no interest in it.

2 Lovell Reeve described, as new, very nearly two thousand species of mollusca, on a rough computation, but amongst them are many well-known and fine members of their class. He narrates in his 'Conchologia' that the *Cypræa subviridis* was the first he essayed to differentiate, it having been, till his time, confused with *C. errones*. The majority of his species were described in his own monographs, but he occasionally collaborated with the Brothers Adams.

3 Naturally the classification of the 'Conchologia' is now out of date, and the work not scientifically so reliable as when first issued; but to our mind the excellence of its plates will for ever remain unrivalled.

AUTOBIOGRAPHY OF A CONCHOLOGIST.

(A Fragment).

"WERE these shells ever alive?" I remember once asking a sailor who had sauntered into a shop where I was apprentice, with a little bundle of cowries. "Alive!" said he, "I believe you, my boy, every one on them." How distinctly I recall to mind the chuckle with which he opened out his double knotted blue calico handkerchief on the counter. Whether any doubt lingered in the sailor's mind as to their once living existence I did not stop to consider. His answer and the sight of the brilliantly enamelled shells made a strong impression on me, and the purchase of them for a few pence was the starting point of my conchological pursuits—I had already begun to be a collector of objects of virtu. My apron-hook, which I still keep as a reminiscence of the sweets of my early life, was made with a choice coin, an Oliver Cromwell shilling. My master, the eccentric G——, was also a "collector," along with the business of a grocer. . . . . Not long afterwards I came to know that my shells really had been alive, in the sense that bones have life in the living quadruped or bird; I learned that they were the work of an animal whose skeleton is developed outwardly, and which being exposed to light and heat, while secreted from the glands of a calcifying organ called the mantle assumes fantastic shapes, and is painted with all the colours of the rainbow. It happened that among those to whom I exhibited my treasures was one W——, a name well-known to connoisseurs in after days by a beautiful little cowry, named in honour of his loving industry. It is a goodly practice among naturalists thus to preserve reminiscences of each other. Well do I remember the pride with which in an early stage of my career I learned that a new Australian cowry had been named after myself! Cowries have always been favourite shells with the conchologist. On looking at my little collection W—— began to dilate with zeal upon their formation, and describing with glowing interest how that the animal occupant extended a mantle from out the aperture on either side covering the entire shell which it had formed by the secretion of successive layers of highly vitrified enamel. "But come and sup with me," said my new acquaintance, "and you shall see many other curious specimens, and I will tell you stories of their life and habits that will surprise you, and interest us both." Good W——, with fingers dyed as though they had been dipped in Tartarus, was a compositor in the well-known printing office of Messrs. Spottiswoode, and he lodged at a house in Fetter Lane. It was my own lot to be bound apprentice to a grocer on Ludgate Hill, so that like the slug we seldom quitted our

homes except at night. We spent the evening, and many future evenings, pleasantly together, over a cabinet richly laden with conchological rarities, collected by stealth, as opportunity served, among the shell dealers and sailors' homes in the vicinity of the docks; well do I remember the delight with which I used to "box Harry" (our slang term for putting up the shop shutters), and hurry off to Fetter Lane. What a good tempered and intelligent fellow was Walker! How he could talk up to the last expiring minute of my time about his shells, not as a fusty old collector of ornamental toys, but as a genuine naturalist, showing me how that the mollusc, the animal inhabitant, had the widest and most varied range of habitation of all moving creatures, living at great depths and heights, in almost all latitudes, how that it lives both in and out of water, and is known to swim, dive, float, bore, crawl, leap, climb, and possess, in short, the faculties of almost every other animal but that of flying. With this encouragement I turned collector myself. My cabinet was a deal box about two feet square, fitted with sliding boards, and I kept it in my bedroom, a back attic with a low bent roof, and square latticed window opening over the famous Belle Sauvage yard. Many an early hour did I spend at that window looking now at my shells, then at the arriving mails. Who does not remember Robert Nelson and the smart four horse coaches of the once noted Belle Sauvage? How merrily the guards sounded their horns. And what frequent customers at our shop were these same guards and coachmen. There was old Walter of the Cambridge Star, Tom Cross of the Lynn Rover, Bill Neck-o'-Nothing of the Devonport Mail, Knowing Jim of the York House, Bath, Harry Horton of the Birmingham Tallyho, brother of Priscilla Horton, the actress, afterwards Mrs. German Reed, whose lively laugh one could hear ere he turned the corner of the Old Bailey, and a host of other jovial spirits. Where be their gibes now, their gambols, their songs, their flashes of merriment! An incident occurred about this time which . . *(Here the MS. ends abruptly).*

EXTRACTS FROM THE DIARY OF MR. LOVELL REEVE in 1849.

JANUARY 8TH.—Evening occupied in selecting specimens from the duplicates of species of shells collected by Sir E. Belcher during the expedition of the "Samarang," to send to my kind friend Thos. Lombe Taylor, Esq., of Starston, Norfolk. Few amateur conchologists have collected shells with more liberality or intelligence. He indulges the pursuit with an honourable zeal to do suit and service to science, and his cabinet will be one of the most complete in this country. How sad it is that the collection of shells in the British Museum is not

characterized by the same critical identification of species as in this and numerous other less important private collections. Although containing many interesting specimens and presenting an imposing aspect in its general arrangement it cannot be consulted as an authority for names.[1]

JANUARY 9TH.—Among our amateur collectors of shells are some distinguished by considerable acumen and knowledge of species, and whose collections manifest a much higher standard of critical discernment than is to be found in the British Museum. Among these may be mentioned Mr. Taylor, of Starston, Miss Saul, of Limehouse, Mr. Metcalfe, of London, independently of Mr. Cuming, whose collection contains the types of nearly all the species (and there are many) that have been described in London during the last sixteen years, including the results of his productive voyages in both hemispheres. It is to be hoped this collection will go to the British Museum.

JANUARY 20TH.—Engaged in looking over my stock of "Conchologia Systematica," of which four or five copies have been sold during the last few months, though it is six years since it was published; it is a poor work, would that I had it to do now!

JANUARY 23RD.—To a meeting at the Zoological Society where Mr. Gray was occupied with a paper on the Turbinidæ, in which family he proposes to separate the group of small white species hitherto arranged with Delphinula. Upon which I thought it necessary to state to the chairman, owing to the many occasions in which I had to differ from Mr. Gray's juggling of the genera, that in the present instance I fully concurred with him, having experienced considerable unwillingness to include these with the Delphinula type at the time of the publication of my monograph. A discussion ensued on Mr. Gray's theory of regarding the operculum of the univalve shell as the homologue of the pair-valve in the bi-valve which Prof. Owen and each who spoke on the subject showed to be extremely absurd. Dr. Melville's paper on the "*Ideal* vertebræ" sent me home to bed.

JANUARY 24TH.—My poor "Elements of Conchology" advances but slowly. Business absorbs my whole day, day after day, and the little leisure I have from "C. Iconica" has been occupied with the shells and mollusca of the voyage of the "Samarang," add to which an occasional love of relaxation in which I find the chief elements of health and spirits.

JANUARY 30TH.—The 71st number of the "Conchologia Iconica" commences the genus *Achatina*, affording material for several attractive plates. There will not be much of novelty to record in this

1 Happily this state of things has long since altered for the better.

genus, the more recently discovered species having been anticipated by Dr. Ferussac and Dr. Pfeiffer. A visit last year to the magnificent collection of Mr. Dennison, of Woolton Hill, near Liverpool, enabled me, however, to bring away one or two fine specimens received by him from Bogata and Vera Cruz. The land shells recently discovered in this district, the interior of New Granada, and about the base of the Cordilleras are superior in beauty to those of the Philipines.

FEBRUARY 7TH.—Renewed my acquaintance with the "Elements of Conchology," of which I hope to publish a number on the 1st proximo. I very much regret having so long neglected this work, especially as it sold so well, and must really try and finish it. The difficulty I have to contend with is to find any time in which to think; it is not easy to write the description of a new shell amid the interruptions of daily life, but having no closet to "shut the door about me" and little time to go into one if I had it, I must be content with what can be.

FEBRUARY 13TH.—To the Zool. Society where I had a paper on a beautiful new *Bulimus*, locality unknown, but from its appearance I should suppose it to come from the rich arborescent woods of New Granada. Mr. Gray proposed a new sub-genus of Tortoises and an extremely warm argument took place between Dr. Melville and himself on the propriety of it. Mr. G. seemed to have the discussion of the preceding in his memory when his absurd theory of the operculum of the spiral shell being analogus with the second shell of the bi-valve was so ably demolished by Prof. Owen, Dr. M., and others.

FEBRUARY 17TH.—Letter from Mr. Dennison, of Woolton Hill, a country amateur of humble origin, but who having succeeded to the possession of a large fortune spends it most lavishly in the purchase of costly shells. His collection is composed almost entirely of exceeding precious specimens in the finest possible condition. He does not collect for any scientific object, nor cares about completing a genus. His cabinet is of the most costly rosewood, beautifully decorated with elaborate carving, and with plate glass, and paintings of the interior of cathedrals in the panels. Every drawer is lined with velvet, in which the shells are placed like a mess of porridge, without names, and is covered in by a glass top with lock and key. By paying liberal prices for specimens, all the rarest and best that come into the country are offered him.

MARCH 7TH.—Letter from Mr. Guise, of Elmore Court, inclosing a very accurate and spirited drawing of a fine *Panopæa Aldrovandi* for publication in the "Elements" showing its proboscis. This fine specimen of a large Mediterranean mollusk was taken alive two or

three years since near the port of Messina, and purchased by the Rev. L. B. Larking, who was staying there for the benefit of his health. He had it alive for some little time in a large washing tub. Its proboscis at that time was about two feet in length when fully exserted. When irritated the animal would throw it about right and left, inspiring the water through one of the siphons and ejecting it from the other with great force.

MARCH 8TH.—Principally occupied this morning in arranging a small parcel of shells received from M. Petit, of Paris, among which are two fine specimens of the curious *Bulimus caledonicus*. Afterwards in examining the small species of *Achatina* including several collected by Mr. Benson in India.

MARCH 12TH.—Much engaged to-day in remodelling the description of our new genus, which instead of calling *Clymene*, have christened *Hemipecten*. The Nomenclator is charged to the brim with the names of sea-nymphs, there is not a Nereid left! And the daughters of Oceanus are all "used up." Its affinities appear now to come nearer to *Anomia* than *Pedum*, but more allied to *Pecten* than either.

MARCH 14TH.—To Mr. Cuming's to look out the remainder of his *Bulimi* having gone through, described and figured, when this remnant is finished, the whole of his species of this genus, amounting to upwards of five hundred. Whilst there Capt. Spratt, just promoted from the rank of lieutenant to that of commander R.N., paid Mr. Cuming a visit. This intelligent officer has taken considerable pains to collect the land shells of Crete, Lycia, and islands of the Grecian Archipelago, and promises to perform great things as soon as he has the command of a vessel. There is a great difficulty in collecting in a foreign expedition in our navy unless the captain has really a taste for natural history himself. A naturalist is voted a bore and the crew find little interest in working the dredge. Letter from Mr. Darwin offering in the kindest terms to sign my certificate for the Royal Society: "I have heard an account with what uncommon zeal you have pursued natural history and on this ground I shall be happy to append my signature to your paper, and to wish you all success. I hope for the honour of that Society your being in the publishing trade cannot be the smallest objection to you."

MARCH 17TH.—I am so bewildered with work, in addition to the demands of business, I scarcely know how best to employ my time, "Iconica" on the one hand, "Elements" on another, "Samarang" mollusca on a third, and Belcher's duplicate specimens to arrange and dispose of to help in part to procure the means whereby I live. Thank God, however, all are progressing.

MARCH 20TH.—"Feeling unwell, obliged to withdraw from business."

SELECTIONS FROM CORRESPONDENCE.

Southampton, *Sept. 14th, 1846.*

My dear E— :

Having despatched a hurried letter this morning to Frederic,[1] with instructions to shew it you as a notification of my lonely yet tumultuous existence, I now sit down in order to have a sort of *electro-magnetic* chat with my *cara sposa*. First, let me look over your note, which I have read over a good many times in the absence of a second edition to see what 'quæres' elicit any reply before I commence giving you any analysis of my time in Southampton.

* * * * * *

The next subject that you touch upon is devotional; believe me, my dear E—, the pleasures of scientific enquiry in my case are not those which allure the enquirer away from the Author and Finisher of these objects. My enthusiasm is one of moderation; the greater the amplitude of thought induced by such a multiplicity of subjects as are now associated in this locality, the more I halt to consider the insignificance of my own knowledge of things, and the profound adaptation and immensity of the source from which they have emanated. I had already arranged to cross over by the Isle of Wight packet to Cowes, and spend a quiet Sunday with Mr. Bates, the Secretary of the Royal Yacht Club, a devout and excellent man, who seemed really as much pleased with my coming as I was with my visit. We attended service morning and evening, and I returned by the Mail Packet which did not sail till nine o'clock. I walked up to Osborne House, and was fortunate enough to meet with three of the royal children: one, a girl, I conclude the Princess Royal, on a pony, alone, a groom leading the other two, face to face in a pair of panniers hung with red cloth, one of these, the Prince of Wales, was laughing and playing most obstreperously. I must, however, retrograde a little; on Friday we had a most interesting discourse from Mr. Owen, which elicited a discussion in the end upon the subject of England having formerly constituted a portion of the European continent. This was again agitated to-day, arising from a paper read in the presence of Prince Albert, who walked about the room as 'one of us,' by Prof. Forchammer, from Copenhagen; the detail of these observations I will relate to you in brief when I return. On Saturday we assembled about two hundred strong on board the good ship *Lady de Saumarez*; the weather has been one unclouded sunshine throughout the meeting, and a more agreeable excursion than this was cannot be imagined. Imagine the learning of the world, as illustrated

1 Mr. Frederic Reeve.

by her several European representatives, passing round an island exhibiting the geological structure of the crust of our globe with much minuteness under the influence of a sunny sky, that you might almost fancy some invisible hand had been round the night before with a huge scarifier to lay bare the surface and clear it of unnatural débris for our inspection! Every stratum of chalk and different coloured earths and sands are displayed in sections under the cliffs, and every point of interest was explained as we steamed along, by the different geological chiefs most conversant with it. Imagine, then, this floating beacon of philosophy, with now a Murchison, now a Buckland, mounted on some conspicuous eminence in the vessel, holding a series of conventicles, though I must say that the latter, notwithstanding his clerical habiliments, looked more like a Lavater than a Roundhead, his countenance beaming with good nature, his language teeming with figures of fun. It was quite dark long before we got back to port, having landed twice for a closer examination of the scenery. To-day I have been attending the sections; my diagrams have just arrived, and to-morrow or Wednesday I am going to hold forth on the calcifying functions of the mollusca.

I find I have got into a third sheet of paper, and am becoming rather prosy; so will reserve further accounts till my return, as I think of running over to Portsmouth to-morrow. I may, however, have to defer this till Wednesday, as we all dine together to-morrow, the president in the chair.

The Queen came to the pier this morning in the royal yacht to fetch Prince Albert, but did not land, notwithstanding the city Bumbles turned out with their regalia. She waited there half-an-hour for the prince, and had the president in for a chat.

* * * * * *

I hope, please God, to be with you on Thursday, though it seems an age to think of. The time here is a paradox, it flies quickly, though it seems the realization of an age.

Excuse errors, for I haven't time to revise my letter, and believe me, Ever, dear E—, with kisses to yourself and bairns,

Your affectionate husband,

(*Signed*) LOVELL REEVE.

[*Copy of Letter*].

British Association, Birmingham,

My dear E—: *Sept. 15th, 1849.*

I was glad to receive your letter to-day (having none yesterday), and am pleased to find you speak so kindly and sincerely of your reception in Ipswich. I am just returned from our excursion to the Dudley Caverns. It has been truly an extraordinary sight. They

consist of excavations of great magnitude in the limestone rocks, and were lit up for the occasion, at the expense of Lord Ward, with from fifteen to twenty thousand candles, and extensive gas illuminations and red and blue lights. Dudley is about ten miles distant, and our party travelled thither in canal boats. We were fortunate enough to head the party. Upon arriving at the extremity of the cavern, Sir Roderick Murchison addressed the multitude (for many thousands were assembled, the public being admitted freely after the Association had passed in) with the aid of a speaking trumpet, and described the geological structure of the caverns. Three stentorian cheers were given for Lord Ward, three for Murchison, and the Geological Society, and three for France in honour of the presence of the French Ambassador, who returned thanks through the speaking trumpet. A canal flows through the caverns, serving to reflect the illuminations, and upon returning along a lofty subterranean gallery, to look down upon the multitude of visitors, illumined at intervals by the burning of the blue and red fires, presented a scene I shall never forget. Sir Roderick led the van, distinguished by a green chieftain's hat and feather. Upon getting into daylight he recognized me, with an "how d'ye do"? recollecting me, I presume, by my portrait. From this point our party proceeded to the summit of a rock forming the brink of a huge hollow basin, called the Wren's Nest. Here Sir Roderick delivered an excellent lecture on the geological features of the surrounding country, and a vote of thanks was proposed by the Bishop of Oxford in a glorious speech in which he styled him the "Silurian King upon his Silurian Throne" (the name given by Sir R. to the bed of rock upon which he was sitting), and the hills again resounded with cheers. Mr. Robert Ransome has arrived, and was with us to-day at Dudley; he is gone this afternoon to the Hydropathicum and will be back on Monday.

* * * * * *

I am just returned from church. The Bishop of Oxford's sermon was truly powerful; the church was crowded to suffocation, and yet everyone listened to it with immense interest. It was a charity sermon for the benefit of the lying-in hospital, but which he made chiefly subservient to the subject of the cholera and the thankfulness with which the people of this town ought to be inspired on account of their immunity from this disease. He explained through the parable of the leper why we ought to regard all sickness (not all pain) as a visitation for some offence; whether he quite persuaded me of this I hardly know—at all events, he inspired me with sincere feelings of gratitude to God for the preservation to this time of myself and all that's dear

to me on this side of the grave; and I gave half-a-sovereign as a thank-offering, and renounced my intended visit to Kenilworth.

Mr. Gould joins us to-day at dinner, and in the evening we are going to meet a few zoological friends at Mr. Spence's. Now that a new week has commenced I am looking forward to the pleasure of meeting you and the children again at Ipswich, preparatory to our return home.

Ever, my dear wife,

Your faithful and affectionate husband,

(*Signed*) LOVELL REEVE.

Have just heard that £101 was collected after the sermon. Mr. R. went.

* * * * * *

Reply to a letter received January 17th, 1863, from C. C. Blake, Esq., informing me that I had been selected for nomination (on payment of £2 per annum) as a foundation member of the proposed Anthropological Society:—

Sir,

I feel much honoured by being nominated for election into your society as a foundation member, but I have not yet reached higher in the series than the mollusks, and anthropology therefore is quite beyond me. In ichthyology my pursuits are limited to the dinner table, with ornithology I rarely occupy myself, except in the game seasons, or from oological motives, and my observations on the mammalia are directed to the habits of a splendid specimen of the genus Equus which takes me to and from the station. I am sensible that the noblest study of mankind is "anthropology," but it will not add to the anthropological strength of your society to enroll amongst its members

Your very obedient servant,

LOVELL REEVE *(Signed).*

C. C. Blake, Esq.,
Hon. Sec. Anthrop. Soc.

The following extract from the introductory chapter of a 'Narrative of a Walking Tour in Brittany, by J. Mounteney Jephson and Lovell Reeve, will tend to exhibit the latter in a new light, as an amateur photographer. The 'Narrative' was sold with ninety stereoscopic plates, issued separately.

It only remains to be said that Mr. Lovell Reeve was twice married, in October, 1837, and again in 1854; by his first wife he left surviving three daughters and a son, but there was no issue of the second marriage. Mrs. Reeve, however, was resolved to complete the *magnum opus* of her husband's life: the "Conchologia Iconica," and with the aid of Mr. G. B. Sowerby, senr., published vols. 16—20 (five in all), inditing the prefætial remarks to the last volume.

I must again tender my best acknowledgments to Miss Jessie Reeve for so kindly providing me with so many details and MS. in connection with her father's career.

Albinism at Eastbourne.—A large number of *Valvata piscinalis* have this summer been dredged in a ditch at Litlington, a few miles out of Eastbourne. On being cleaned about two per cent. turned out to be the var. *albina* Taylor, pure white and very beautiful little shells. Several specimens of *Limnæa peregra* var. *candida* have been found at Wannock Glen and in the Pevensey Marshes. *Helix itala* var. *hyalozonata* is not uncommon on a bank near Beachy Head. *Clausilia perversa* var. *albina* has been taken off a beech tree at "Paradise."—ARTHUR G. STUBBS, Eastbourne, 1900 (*Read before the Society*, Sept. 12th, 1900).

THE LAND AND FRESHWATER SHELLS OF TENBY, SOUTH WALES.

By ARTHUR G. STUBBS.

(Continued from page 328).

Helix virgata *(continued).*

Var. **lineata.**—Common, especially so on the Burrows near Giltar.

Var. **minor.**—Common, fields on the North Cliff, Jubilee Gardens, Castle Hill, etc.

Var. **leucozona.**—Common in the Jubilee Gardens, below the Wreck Field; also at Giltar and Manorbier. Intermediate forms between this variety and the type, showing the band plainly above the periphery, are not uncommon.

Var. **maculata.**—Abundant, the handsomest specimens coming from the Burrows round the Black Rock and Holloway Quarry. Shells from the first-mentioned place have often a maculated band up the spire, but it fades away near the mouth leaving the greater part of the last whorl plain white; usually there are no bands below the periphery in this form.

Var. **radiata.**—An exceedingly beautiful form of this variety is to be found on St. Catherine's Rock, but it is rare. Another paler form has been taken in a very limited area of the Jubilee Gardens and is also rare. Intermediate forms between this and var. *picta* are not uncommon in a few places.

Var. **picta.**—Not uncommon on St. Catherine's Rock, in the Jubilee Gardens, at Giltar, and at Manorbier. The Giltar and Manorbier specimens have often a purplish tinge. Intermediate forms between this variety and the type, and vars. *leucozona*, *moira*, and *radiata* are often met with.

Var. **moira.**—Cottage gardens by the Ritec, at Giltar, and at Manorbier. It usually lives in company with the next variety.

Var. **nigrescens.**—St. Catherine's Rock, Jubilee Gardens, Ritec Gardens, Giltar, Manorbier, and occasionally on the Burrows. My finest specimens come from the Burrows, one measuring 16 mm., but this is an exceptional size for this variety, which is usually rather small. It is most common at Giltar, where it is often blotched with a purple tinge.

Var. **hypozona.**—Abundant in most places. The largest specimens come from sheltered spots on the Burrows and measure from 16 to 18 mm.

Var. **albicans.**—Common.

Var. **lutescens.**—Abundant, and always found with the type.

Var. **rufula-zonata.**—Not uncommon on St. Catherine's Rock, in the Jubilee Gardens, Ritec Cottage-Gardens, and at Giltar.

Var. **ochroleuca.**—This is a very distinct and beautiful form. The bands, markings, and lips are orange or salmon-pink. It has varieties corresponding to those of the ordinary type, but all the markings, etc., are orange or salmon-pink instead of the normal colouring; both forms live together.

Var. **alba.**—There are colonies of this variety on the Castle Hill, St. Catherine's Rock, and South Cliff. It is also very abundant in a grass court-yard at Pembroke Castle.

Var. **hyalozona.**—With the last in all places. This is really the type form of the last, and, as in var. *ochroleuca*, it has varieties corresponding to those of the ordinary type form, but lips and markings pure white.

Var. **coalita** var. nov.—Like the type, but having the bands above and below coalesced, leaving a white zone round the suture and umbilicus only. The Burrows and Jubilee Gardens, not common.

H. acuta.—Very abundant, and having nearly the same range as *H. pisana* in the district. It is most plentiful on the Burrows, in some sheltered spots reaching 20 mm. in length of spire. The best month for collecting this, and indeed the last four species, is September.

Var. **inflata.**—Much inflated specimens of the type and vars. *bizona*, *coalita*, *flammulata*, and *strigata* are not uncommon. The Burrows, Jubilee Gardens, etc.

Var. **elongata.**—Giltar, and a bank in the Jubilee Gardens. Not common.

Var. **bizona.**—Abundant in some parts of the Burrows, and fairly plentiful in some other places. Specimens from St. Catherine's Rock have very smooth and regular bands.

Var. **coalita.**—Common with the last variety. This is var. *bizona* with the two bands coalesced, forming one broad band. Intermediate forms connecting the two are common.

Var. **flammulata.**—Common on some parts of the Burrows living with var. *bizona*.

Var. **strigata.**—Abundant, and very variable as regards the streaking.

Var. **articulata.**—This beautiful variety is found on some parts of the Burrows and in the Jubilee Gardens, but it is not very plentiful.

Var. **nigrescens.**—Not uncommon in the Jubilee Gardens, and a few other places; it is usually rather smaller than the other forms with which it associates.

Var. **alba.**—A single specimen of the type form from Pembroke Castle; albino *H. itala* and *H. virgata* are found in the same spot.

Monst.—Specimens with a twisted spire are occasionally met with, and a not uncommon form of distortion, in places where there is much traffic, is for the last whorl to be much larger in proportion to the others than usual, and turreted.

Buliminus obscurus.—Not very common except on the North Cliff, where they live, in fair numbers, among heaps of dry sticks and dead leaves. Shells as a rule dwarfed, and rather bleached.

Pupa cylindracea.—Abundant everywhere. It varies considerably in colour and the length of the spire.

Var. **edentula.**—Rare, Castle Hill.

Var. **curta.**—Not uncommon with the type on the Castle Hill, St. Catherine's Rock, and in Heywood Lane.

Var. **albina.**—A colony on a wall on the North Cliff, and two or three colonies on walls near Manorbier Castle.

P. muscorum.—This species is not common in the neighbourhood; there are scattered colonies on the Castle Hill, and it is also to be found under stones and among moss on the Burrows.

Clausilia perversa.—Very abundant and variable as usual.

Var. **gracilior.**—North Cliff.

Cochlicopa lubrica.—Widely diffused but nowhere very plentiful.

Var. **lubricoides.**—St. Catherine's Rock.

Cæcilioides acicula.—Two dead specimens on the South Cliff, beneath the Esplanade, and one dead specimen at Hoyle's Mouth.

Succinea elegans.—Abundant in the marshes, and very variable in colour and shape. They may be taken in great numbers off the leaves of the yellow Iris and Reed Mace. In winter I have observed them hibernating under loose stones on the tops of the low walls enclosing the marshes, when they cover the mouth of the shell with an epiphragm.

Var. **minor.**—Penally Marsh, not uncommon.

Var. **ochracea.**—Roadside near Holloway Quarry, and Pendine Marsh; not uncommon.

Var. **longiscata.**—Sides of ditches in Penally Marsh; a well-marked variety and scarce.

Var. **virescens.**—Gumfreston and Pendine Marshes; occasionally with type.

Var. **albida.**—Rare, ditch near Hoyle's Mouth.

Carychium minimum.—Common in damp places throughout the district. About fifty specimens were taken from an old tin kettle lying in a trench of water on the Burrows, apparently none the worse for their temporary immersion.

Planorbis fontanus.—In old pit-holes, full of water, near Hoyle's mouth, common; also sparingly in ditches on Gumfreston and Pendine Marshes.

P. nautileus.—Abundant where it occurs, though local. It has been taken in quantity from a small pond by Penally Station, and from sundry ditches on Gumfreston Marsh. The finest specimens come from the pit-holes near Hoyle's Mouth, where it lives in company with the last species.

Var. **crista.**—Common, with the type.

P. albus.—Common, and widely-distributed in the ditches on the marshes; it is also found in conjunction with the last two in the pit-holes near Hoyle's Mouth; the shells from the latter locality have usually a wide expansion of the last whorl near the mouth.

P. spirorbis.—Very abundant. It is found in almost every ditch and pond in the neighbourhood. It grows to a very large size in a ditch near the Black Rock, where specimens measuring 10 mm. in breadth, or 4 mm. above the average size, have been taken. This species is a favourite building material of the Caddis-larva, some of its cases being built entirely of *P. spirorbis*; even the living mollusc is sometimes pressed into service.

Var. **albida.**—Rare; ditch by the Black Rock.

Monstrosities.—A large number of remarkable distortions have been taken in the Black Rock ditch (see above page 106).

Bullinus hypnorum.—Abundant in several of the ditches on the marshes. It is especially fine in the Black Rock ditch, where specimens of 17 to 18 mm. have been taken. The shells from some ditches are long and slender, from others short and stumpy; the colouring varies from pale yellow to deep reddish-brown, the darker specimens, however, fading considerably in the cabinet. *Planorbis spirorbis* is always found living with it in this neighbourhood, thus confirming Mr. W. Nelson's note in this Journal, vol. 3, p. 115.

Var. **major.**—Ditch by the Black Rock.

Monst. **decollatum.**—Gumfreston Marsh; not uncommon.

For curious distortions from the Black Rock ditch, see above, page 106.

Physa fontinalis.—Not nearly so plentiful as the last species; it occurs locally on the Gumfreston and Penally Marshes. The shells are, as a rule, rather small, and are usually encrusted on the upper whorls with a confervoid growth. A specimen having an abnormally inflated mouth was taken in the Black Rock ditch.

Limnæa peregra.—Exceedingly abundant. As a rule only the smaller forms are to be met with, but these show the customary

variability in shape, colour, and texture, so much so, that I think it may be said that many of the larger varieties are reproduced in a dwarf form in this district.

Var. **lacustris.**—The Ritec stream, Tenby, and a stream at Manorbier.

Var. **lutea.**—Ditches on Penally Marsh.

Var. **acuminata.**—Ditch by the Black Rock.

Var. **vulgaris.**—Various ponds and ditches.

Var. **oblonga.**—Stream near Old Waterworks, Tenby, and stream near Manorbier Station.

Var. **labiosa.**—Ditch by roadside, Laugharne (Chas. Jefferys).

Var. **picta.**—Stream and pond near the schools at Pendine; these are beautifully banded.

Var. **maritima.**—Ponds and ditches; very common.

Var. **pulchella.**—Ditch on Gumfreston Marsh, and a small basin in the Old Waterworks, Tenby.

Monstrosity.—See above, page 108.

L. palustris.—Abundant in the marshes. There is considerable variation in this species also, especially in colouring. The finest shells come from the Black Rock ditch, where it is very plentiful.

Var. **elongata.**—Ditch by the Black Rock.

Var. **tincta.**—Scarce; a few specimens from a ditch near Holloway Quarry.

Var. **albida.**—Five specimens of this very rare variety have been taken from the Black Rock ditch.

Monst. **decollatum.**—Not uncommon in Penally Marsh. See also page 107 above.

L. truncatula.—Very common and widely diffused; April and May are the best months to look for them. The largest measure 13 mm., and come from a roadside stream near Manorbier Station; the smallest adults measure 5 mm., and come from Gumfreston. The colour varies exceedingly: ash-coloured, yellowish-brown, pale-brown, to a deep magenta, while some are tinged with lilac.

Var. **elegans.**—Very fine in a ditch on Tenby Marsh, and at Manorbier.

Var. **microstoma.**—Marsh Road near Holloway Quarry.

Var. **major.**—Stream at Manorbier, length 13 mm.

Var. **minor.**—Ditch near Gumfreston, length 5 mm.

Monstrosities.—Two turreted specimens have been taken.

Ancylus fluviatilis.—On account of the scarcity of fast-running streams, this species is not common. It is found in fair numbers

on the water-wheel of the old mill near Scotsburgh, and under stones in the bed of the stream. A rather curious habitat is the sea-cliff at Waterwynch; it lives on the ledges of the rock near high-water mark. Although fresh water trickles over them from the cliffs above, they must get plentifully washed with sea-water at the high-spring tides. The white variety is as common there as the type, and both are much eroded at the apex; this is probably due to the action of the salt-water.

Var. **albida.**—Waterwynch; common.

Velletia lacustris.—Common in the marshes. It seems to have a preference for the decaying stems and leaves of the Yellow Iris, Reed-Mace, and Bur-Reed, but is occasionally found on the Water Plantain and floating Pond-Weed. Some specimens are much narrower and more elevated than usual, and may probably be the var. *moquiniana* (Bourg.).

Var. **albida.**—Not uncommon in the Ritec stream, and in the old pit-holes near Hoyle's Mouth.

Cyclostoma elegans.—Abundant among the Dewberry Brambles at Giltar. There is also a fair-sized colony of the type and vars. *fasciata* and *ochroleuca* under Privet bushes in the Jubilee Gardens; the shells are larger and more handsomely marked than the Giltar specimens, though in all probability they originally came from that place. It is common at Pendine.

Var. **ochroleuca.**—Jubilee Gardens and Giltar.

Var. **fasciata.**—Jubilee Gardens.

Valvata cristata.—Abundant, and apparently the only representative of the freshwater Operculata in the district. The finest specimens measure 5 mm., and come from the Black Rock ditch. This species seems to prefer the grass and plants at the bottom and sides of a ditch, and does not swarm on the under-sides of floating weeds, like the *Planorbes*; a scoop with the dredge along the surface will often not produce a single *V. cristata*, though the ditch may be swarming with them down below. Slightly twisted specimens are not uncommon, and one has the last whorl near the mouth coiled away from the body-whorl, but it is not nearly so liable to deformity as the *Planorbes*.

Anodonta anatina var. **complanata.**—This variety is still fairly plentiful in the Ritec stream near Gumfreston, the locality mentioned by Gwyn Jeffreys (B.C., vol. 1, p. 45). It is rather wonderful that they have not been exterminated, as the bed of the stream at that part is continually being dug out afresh, and the banks are periodically strewn with dead shells.

Sphærium corneum.—Common in ditches and streams on the marshes. The largest measure 13 mm., and come from a ditch on

Penally Marsh below Giltar. Some remarkably globose shells come from the same ditch, one specimen being of the same breadth as its length, viz., 8·5 mm.

Var. **nucleus.**—Ditch by the Black Rock.

S. lacustre.—There are three small ponds containing this species. One, near Hoyle's Mouth, has a large form of the type, and a smaller form of a beautiful pearly-grey shade, almost white. They live together in the same part of the pool, and all sizes from the very young to the mature shells have been taken in both forms; moreover, the difference in colour is constant all through. Another pond near the gas-works contains the type, and a small pond near Holloway Quarry a form allied to the var. *ryckholtii.*

Pisidium amnicum.—The Ritec stream near Gumfreston. The shells are large, 10 to 19·5 mm., and live in the same part of the stream as the *Anodonta anatina* var. *complanata.*

P. fontinale.—Common in the marshes; it is, however, as a rule rather small in size, and variable in shape.

Var. **cinerea.**—Very fine in a pond near the gasworks, and a pool near the old mill.

P. pusillum.—Abundant everywhere, and especially fine in the Black Rock ditch.

Var. **obtusalis.**—Penally and Gumfreston Marshes.

P. milium.—Common on the Penally Marsh and in a few ditches elsewhere. Specimens from a ditch below Giltar are above the average size, and an aberrant form has been taken on the marsh near Penally Station; it is larger, more oval, and coloured differently from the type.

The following records for the county of Pembroke are not given in the Distribution Tables of L. E. Adams "The Collector's Manual," ed. 2.

1. *Arion circumscriptus.*
2. *A. gagates.*
3. *A. lævis.*
4. *Hyalinia pura.*
5. *H. crystallina.*
6. *Helix aculeata.*
7. *H. pulchella.*
8. *H. fusca.*
9. *Buliminus obscurus.*
10. *Cæcilioides acicula.*
11. *Planorbis fontanus.*
12. *P. nautileus.*
13. *Limnæa truncatula.*
14. *Sphærium lacustre.*
15. *Pisidium amnicum.*
16. *P. milium.*

The following papers, previously published in this Journal, may be referred to :—

1.—J. W. CUNDALL: "List of Shells taken at Tenby," vol. 6, p. 102.

2.—A. G. STUBBS: "Observations on Abnormal Specimens of *Planorbis spirorbis* and other Freshwater shells at Tenby," vol. 9, p. 106, 1898.

3.— ——— "Observations on *Limnæa peregra*," vol. 9, p. 112, 1898.

4.—R. STANDEN: "Remarks on the cause of Abnormality in *Planorbis spirorbis*," vol. 9, p. 216.

Balea perversa.—Colonies on walls in several places. Two forms are found: one short and stumpy, the other long and slender. North Cliff, Heywood Lane, etc.—(*Note added* Aug. 19, 1900).

Note on Tapes pullastra Montagu.—Some doubt having been suggested as to whether this shell ought not to be called *T. geographicus* (Gmelin), the following observations may be of interest. Jeffreys (Brit. Conch., vol. 2, p. 357) records his opinion that *Venus geographica* is a variety of *Tapes pullastra*, and since the former name was given by Gmelin before the latter was proposed by Montagu, the step might at first sight seem necessary. The fact is, however, that Jeffreys was in error; indeed it would seem as though he had not actually looked up the authorities to whom he refers. The two shells are quite distinct, and Montagu's name must stand for the British species.

Gmelin (Linn., Syst. Nat., ed. 13, p. 3293) created his *Venus geographica* with the following references :—Gualt. Test., t. 86, f. H.; Chem. Conch., 7, t. 42, f. 440. The former figure is very indecisive, but the latter is unmistakably *Tapes geographicus*, the well-known Mediterranean species.

Montagu (Test. Brit. I., p. 125) gives for his *V. pullastra* these references :—Chem. Conch., vii., t. 42, f. 439; Linn. Trans., vi., t. 17, f. 13, 14 (*Wood*). The two Chemnitzian figures referred to by these several authors are as different as possible. It is true that Chemnitz refers his fig. 439 (erroneously) to *Venus litterata*, but Montagu expressly states that it "is exactly the shape of" his, whilst he also points out (as is indicated by his second reference) that Wood was the first to separate *T. pullastra* from *T. decussata, with which it had previously been confused*, though he did not give it a name.

Both *T. pullastra* and *T. geographicus* occur in the Mediterranean—a fact of which Jeffreys, evidently from the wording of his remarks, was unaware. Both are cited by Locard, and placed in widely different groups. Römer did not admit Jeffreys' dictum of their identity.—B. B. WOODWARD (*Read before the Society*, September 12, 1900).

CERTAIN TERRESTRIAL TESTACEOUS MOLLUSCA FROM SOUTH-WESTERN EUROPE.

By Surgeon K. HURLSTONE JONES, M.B., R.N., F.L.S.

(Read before the Society, June 13th, 1900).

The Channel Squadron, in which I have recently had the honour of serving, usually makes two cruises a year to the south-west of Europe —one in the spring, and the other in the autumn months; and it has been during these cruises that the following notes and observations have been made.

The Iberian Peninsula is the part of south-western Europe which the Channel Squadron mainly visits, and Gibraltar is naturally its head-quarters when cruising in those parts, so that it is not remarkable that most of my notes refer to that fortress. Other places at which I have had the good fortune to take conchological notes are Arosa Bay, in the north-west of Spain, and Algerciras in the south, on the opposite side of the bay to Gibraltar, Lisbon, Cintra, and Sardinia.

Arosa Bay is a magnificent natural harbour, the shores of which teem with the littoral marine mollusca of the north temperate Atlantic —*Buccinum*, *Purpura*, *Trochus*, *Patella*, etc., but it is not proposed to deal with these here. The geological formation is all old red sandstone, and the soil metamorphic and very rich. The sandstone occurs in the shape of great rounded boulders on the slopes of the hills, and as rocky islets in the bay, whilst the apex of nearly every small elevation is a quaintly-shaped pile of the same rock. The country is thickly populated, the people being evenly scattered over its surface, or congregated in very small villages, and the ground is widely cultivated in a rather slip-shod manner.

At Gibraltar the formation is limestone, and the same holds good for the hills at Aranci Bay and Cagliari, the two places at which I have collected in Sardinia. The country around Gibraltar is rich but very barren, scantily populated, and to a great extent uncultivated, as is also the case at Aranci Bay, whilst at Cagliari I spent so short a time that I could make no observations worth recording as to the country in general.

At Arosa Bay, where vegetation is luxuriant and plentiful, and limestone the geological formation, a condition was produced, which I have noticed also in a less marked degree under similar circumstances elsewhere, namely, that whilst the soft parts of the terrestrial mollusca were large and well developed, the shells on the contrary, though of necessity large in order to cover the soft parts, were of extreme thinness, so much so that, like those of *Helix fusca*, they required the

greatest care in handling, so readily were they broken. Shells were fairly plentiful, but required carefully looking for at Arosa and Aranci Bays, whilst at Gibraltar, Cagliari, and to a rather less extent at Cintra, near Lisbon, they fairly swarmed.

I am much indebted to Mr. J. H. Ponsonby for the kindness with which he has helped me to name certain of my specimens, and also to papers by him and by Dr. Kobelt.[1]

Parmacella calyculata (Sow.).—I found the shells of this species fairly commonly in the rifts and crevices of the rock at Gibraltar on the way up to the signal station, but I could never discover a living specimen. I do not, however, concur with Dr. Kobelt and Mr. Ponsonby in considering it rare, for the shells are extremely plentiful, but the species has very likely increased since their observations were made. Taken also at Algerciras.

Hyalinia draparnaldi (Beck).—Like all the *Hyaliniæ* this species was rare at Gibraltar, and about half-a-dozen specimens, dead and alive, represent all that I obtained in many weeks careful collecting there.

H. cellaria (Müller).—One or two specimens of this species were taken on the top of the hill where the memorial to H.M.S. "Serpent" is placed at Arosa Bay, in October, 1898.

H. calpica (Kobelt).—A few specimens which I think may be safely relegated to this species.

Helix lenticulata (Fér).—This find adds another to the list of inexplicable disappearances and recurrences of species, for Dr. Kobelt in 1884 found this species commonly at Gibraltar, whilst after many weeks' careful searching in 1898-99 three dead shells were all that I could find. I found it also at Cagliari.

H. coquandi (Morelet) var. **ellioti** (Kobelt).—Of the two forms of this mollusc, the yellow shelled one is found all over the western side of the Rock, whilst the five banded is, so far as I could ascertain, confined to one small tract, consisting of about forty yards of a path in the uppermost part of the Alameda Gardens, bordered by a species of Aloe. Here this species is moderately plentiful, and here alone at the present time the five banded form occurs, and although the yellow one is found in other parts of the Rock as well, it is scarce, and generally one at a time only can be taken. Another curious point is the fact that I only found this snail occurring in the above mentioned tract in the adult state during the last three weeks of November, 1899, and although I searched most carefully during the same three weeks of 1898 I never saw one there then. Dr. Kobelt, in May, found the young of this species much more common than the adults, whereas

1 *J. Conch.*, vol. 4, p. 1-9, 1883, p. 266, 1885.

I never noted any young ones amongst the few I saw in that month, but in November immature specimens were decidedly in the majority. The five banded form occurred to the extent of about 25 per cent. of of the total specimens. Curiously enough I could never find this species on the Spanish mainland near Gibraltar.

H. lactea Müll.—With the doubtful exception of *H. marmorata* this is perhaps the commonest terrestrial mollusc which Gibraltar produces, for except right in the town it is common everywhere, but much more so on the western face of the Rock than the other. It has a habit peculiar to it and to *H. virgata*, *H. pisana*, and to a less extent to *H. marmorata*, of fixing itself in some exposed position in the full glare of the sun and waiting there till the heavy night dew commences to fall, when it proceeds to feed. In wet weather, however, it prowls around in search of something to eat in the daytime. It may be as well to mention here the fact that this species, in common with *H. marmorata*, *Rumina decollata* and *Hyalinia draparnaldi* suffers severely from the attacks of certain parasitic diptera and coleoptera. I have frequently found specimens of the above species, from the mouths of whose shells was trickling a thick, black slimy material; such shells are often found to contain as many as twenty or thirty dipterous pupæ. Again I have frequently taken *Rumina decollata* with almost all the whorls filled up by a big white coleopterous larvæ. I was at first of opinion that these larvæ had only attacked the molluscs after death, but later I had the good fortune to observe a coleopterous larva attacking a living, immature *H. marmorata*, and this larva I kept until it became a perfect insect, one of the Drilidæ. There can be no doubt from the differences in size of the larvæ, and from the fact that my specimen completed its metamorphosis in a comparatively young *H. marmorata*, that the larger ones are those of a different species.

The Gibraltar specimens, though nicely marked, are not very large, but here again there is a good deal of difference between those from the limestone near the top of the rock and those from the metamorphic deposits at its base—the former are far more solid and rather smaller than the latter, and as a rule less brightly marked. I found this shell numerous both at Algerciras and Ronda, on the Spanish mainland, where, however, the specimens are smaller than they are in Gibraltar.

Var. **alybensis.**—This variety, named by Kobelt, is still the commonest form at Gibraltar.

Var. **maura.**—Occurs sparingly at Gibraltar and more plentifully at Ronda, a town about eighty miles inland from Gibraltar.

Var. **grisea.**—A curious point about this variety is the fact that whilst in the autumn of 1898 it only formed about five per cent. of all

the specimens, at the same time of year in 1899 it had increased to about twenty-five per cent. of the adults and even more than that among the young.

I think an analogy presents itself here between the sudden increase of this variety of *Hyalinia lactea* and that of var. *ellioti* of *H. coquandi*. Both occurred for some unknown reason at the same season of the same year. The specimens of this variety which are found in the Alexandra Gardens and lower parts of the rock generally are as a rule both larger and darker than those obtained at a higher altitude in Gibraltar.

Var. **alba.**—Albino-shelled specimens of this species have long been known, but so far as I can ascertain, not yet named. I have, therefore, proposed the above (*antea* p. 302). Kobelt found albino specimens of *H. lactea* commonly at Gibraltar, as well as those pseudo-albino forms which usually occur with the animals bearing truly albino shells. At the present time there is one small spot only (so far as I know and I have searched very carefully) where this variety occurs. This place is a slope above the path leading to Monkey-cave range, and is not many yards square. This variety is not very common there and four is the greatest number I have ever taken in an afternoon's collecting. Forms with light fawn or pinkish mouths and often with light yellow translucent bands also occur but very sparingly.

I also took in the same spot as the albino specimens alluded to above a very curious form in which the five bands were all suppressed except the third one, a condition so common in our own *Helix nemoralis*, but which, except for my own three specimens, I have never before seen in *Helix lactea*.

H. vermiculata Müll.—A few were found among limestone rocks at Aranci Bay, and one specimen in the ancient Roman amphitheatre at Cagliari in Sardinia. The specimens were all typical.

H. marmorata (Férussac).—This is, I believe, the commonest shell-bearing mollusc in Gibraltar, if possible even more so than *H. lactea*. Everywhere this snail is to be found, even on the walls of the houses in the town and down by the dockyard; but its stronghold is the high slopes on the western face of the Rock, where it can in dry weather be found in the cracks and crevices of the limestone, in masses of twenty or thirty at a time glued together by dried mucus. This is, however, only in dry weather. In wet weather it is very lively, crawling about on the face of the wet rocks and among the herbage. I could not find it at Linea or Algerciras, places in immediate proximity to Gibraltar on the Spanish mainland, although the conditions seemed admirably suited to it there. It occurs, however, again

at Ronda at an elevation of 2,500 feet, and the specimens there found are much flatter, thinner and of a lighter colour than those at Gibraltar. All specimens at Gibraltar are most beautifully marked and several well differentiated forms occur, the two most distinct of which are, one with five distinct bands, three above and two below the periphery, and one in which there is the usual mottling above with two distinct bands below. I also took two specimens of the form I have named var. *alba*, one of which curiously enough was found among the albino *H. lactea*.

Helix hospitans (Bonelli).—I found a few nicely marked specimens of this species in the ruined Roman Amphitheatre at Cagliari, Sardinia.

Var. **alba.**—About equal in numbers with the type at the same place.

H. virgata (Da Costa).—Found at Gibraltar, Algerciras and Linea only. Linea, I might mention, is the Spanish town which lies just beyond the neutral ground to the north of Gibraltar. The specimens vary enormously in size and coloration, but for the most part although the size is approximately that of those found in Great Britain their brilliancy and beauty is far beyond anything I have ever seen in our Islands. At Gibraltar and Linea this species is only fairly common, but at Algerciras it swarms everywhere, and exposes itself even more than *H. pisana* and *H. lactea* to the rays of the sun. The varieties of this species most commonly met with were:—

Var. **radiata.**—This beautifully marked variety is very common both at Gibraltar and on the Spanish mainland and specimens of it are often of great size.

Var. **albicans.**—This variety is only found on the banks bordering the road which runs from Algerciras to Tarifa; it is there fairly plentiful.

Var. **leucozona.**—This is common at Algerciras; the specimens are usually small.

Var. **nigrescens.**—Very plentiful at Algerciras, but of rather small dimensions.

Var. **major.**—Many specimens approach this variety from their exceptional dimensions.

H. illibata Parr.—Three specimens of this species were taken near Algerciras and, so far as I know, it has not been taken there before.

H. caperata (Montagu).—I have taken a few specimens of this species at Gibraltar, on the road running to Willis's, above the Moorish Tower. The specimens are of normal size. This is I believe a new record for Gibraltar. I also took a few specimens of this species on the top of the hill where the monument to the officers and men of

H.M.S. "Serpent" is erected at Arosa Bay. These last were, like all the Arosa Bay shells, extremely thin and fragile. Var. *ornata* occurs with the type.

H. pisana (Müller).—This is a very common species all over such parts of south-western Europe as I have visited. I found it plentifully at Gibraltar, Linea, Algerciras, and Cintra near Lisbon, and in rather less quantity at Arosa Bay in the north of Spain, and at Cagliari in Sardinia. The Gibraltar specimens are the largest and strongest, and those from Algerciras the most beautifully marked, whilst the Arosa Bay and Cagliari examples are rather small and inclined to be featureless as regards colouring. The varieties *albicans* and *lineolata* are those most frequently met with.

H. barbula Charp.—This species was only met with at Arosa Bay where it was not uncommon. The shells were fairly large but extremely brittle, so much so that they required most careful handling in cleaning.

H. nemoralis (L.).—I only met with this species about Arosa Bay and Cintra in Portugal. The Arosa Bay specimens were all of large size and rather fragile, whilst in colouring they presented the most remarkable heterogeneity I have ever known this species to exhibit. No two specimens are quite alike, and hardly one of them exactly conforms to the requirements of any varietal name. Some are almost the colour of var. *castanea* and others almost that of var. *rubella* but they are never exactly these. In the Arosa Bay specimens those which approach these two varieties most nearly have a curious shade of green in the composition of their colouring, and all specimens present a remarkable mottled appearance which is due I believe to the texture of the shell itself.

As regards band formulæ the usual 12345 was undoubtedly the commonest at Arosa Bay, and at Cintra was the only one almost, though 00000 and 00300 did occur very sparingly at the latter place. At Arosa Bay the formula which occurred next most commonly to the normal was the rare 00345, which considering its unusual occurrence elsewhere is of note. The Cintra specimens presented in contra-distinction to those from Arosa Bay well-marked examples of the varieties *rubella* and *libellula*.

H. aspersa (Müller).—Wherever I went I found this beautiful mollusc, and always in considerable numbers. The most remarkable specimens that I saw were at Arosa Bay, the largest at Gibraltar, and the most beautifully marked at Cintra. The shells of the Arosa Bay specimens though large and richly coloured were by far the thinnest I have ever seen, reminding one strangely in their extreme fragility of those of *Helix fusca*. So thin were these tests, that they appeared

almost membraneous and could with ease be indented by the finger nail, whilst to let one fall when wet was instant destruction to the specimen. The specimens obtained at Aranci Bay in Sardinia were also frail, but not in so marked a degree.

The following well-known varieties were observed:—

Var. **marmorata.**—This variety I only found at Gibraltar and there confined to a comparatively small area near the Windmill Flats, though an occasional sporadic specimen was rarely met with in other parts of the Rock.

Var. **minor.**—Curiously enough this variety is also only to be found at Gibraltar, where it is sparingly to be met with in the higher parts of the Rock.

Var. **unicolor.**—I am of opinion from my own small observations that this variety, so rare in Great Britain, is one of the commonest on the Continent. At Arosa Bay about sixty per cent. of all specimens were of this variety, and at Aranci Bay about fifty per cent. At Gibraltar I have taken this variety once only. It was possible at Arosa Aay to get together a large series of shells of *H. aspersa* showing a complete transition from the typical form to this variety, so that I think one may safely regard all feebly marked specimens as steps on the way towards the suppression of markings altogether.

Var. **zonata.**—The bulk of the specimens taken at Algerciras were of this variety. It occurred also somewhat sparingly at Gibraltar and was decidedly rare at Arosa Bay.

H. conspurcata (Draparnaud).—Dr. Kobelt says of this species that it occurs here and there and not too commonly at Gibraltar. As a matter of fact I found it now very local, but also plentiful after rain, in the Alameda Gardens and the road just above them and during the autumn months. In March, April and May I have quite failed to discover a single specimen.

H. apicina (Lam.).—When Mr. Ponsonby first found this species at Gibraltar in 1883 it was confined to the North Front, but now it has spread considerably, and is found all over the lower parts of the Alameda Gardens and as far as Rosio Bay to the south. I saw one specimen of the species at Cagliari in Sardinia.

H. acuta (Müller).—This species occurs in countless thousands on the North Front at Gibraltar, though it is also met with high up the Rock, in the Alameda Gardens, and, in fact, all over the fortress besides. Some of the specimens are of great size, but such are rare. I also took this species in some quantity at Aranci Bay and Cagliari in Sardinia, but on the Spanish mainland adjoining Gibraltar I could not find it.

Var. **strigata.**—This is the most common form at Gibraltar.

Var. **alba.**—I took this variety once at Gibraltar.

H. semirugata (Kobelt).—This is a rare form related to *Helix lanuginosa*, for which indeed I mistook it. I have taken it once only in a very circumscribed locality near Algerciras.

Cochlicella conoidea (Drap.).—This species I obtained in two localities only, namely Gibraltar and Cagliari. At Gibraltar, where I believe it has not previously been noted, it is confined to a hedge of Aloes which fringes the road running past the North Guard House, at the southern border of the neutral ground.

Var. **calaritana** (Paulucci).—The Cagliari specimens were of this variety.

C. ventricosa (Drap.).—Only found at Algerciras, where it is extremely abundant in the autumn and in wet weather. In the summer not a single specimen is to be seen anywhere, and even in winter if the weather be dry it is very hard to obtain it. Two forms occur, one with black bands, one to each whorl of the shell, and a bandless form.

Leucochroa rimosa (Paulucci).—Three specimens only from the Roman Amphitheatre at Cagliari.

Ferussacia folliculus (Gronov.).—This species is extremely plentiful at Algerciras, and like *Cochlicella ventrosa*, in company with which I have usually found it, it occurs almost entirely in the autumn and during wet weather. Unlike the *Cochlicella*, however, it always keeps under stone and pieces of wood, and does not climb up the stems of plants and grasses. Numerous young are to be found at the beginning of December. I have only taken this species sparingly at Gibraltar.

Var. **viridans.**—"Shell greenish white." I have ventured to apply this name to a variety I discovered at Algerciras.

Rumina decollata (L.).—I took this species alive at Gibraltar and also noted many dead shells at Algerciras, Cagliari and Cintra, near Lisbon. Common as this species is, it is one of the most difficult to obtain alive. At Gibraltar and Algerciras the dead shells litter the ground in thousands, and yet once only for a period of a few days were the animals to be taken alive in any quantity. The period referred to lasted for about ten days in the beginning of April, when this species was laying its eggs. I could, during that time, find any quantity of specimens on the upper parts of the Rock, especially above the Moorish Tower and towards Willis's. All those I obtained had their shells deeply discoloured by the red earth in which they had recently been buried, and in which, indeed, many were still

partly imbedded when I found them. The eggs are about 3 mm. by $1\frac{1}{2}$ mm., white, with a distinct calcareous shell and well-marked yolk and the average number contained in a single individual was about forty. *Rumina decollata* can, of course, be taken at other times besides during this short period, but it is only in very small numbers or in ones and twos at a time. The most I have myself collected, outside this particular space of time, has been seven, after four days of continuous rain in November, 1898. Young specimens with their apical whorls intact are not infrequently met with, but chiefly as dead shells. *Rumina decollata* secretes a fairly thick white calcareous epiphragm, remains of which always seem to remain attached to the interior of the last whorl of the shell in living specimens. No species of land mollusca suffers more severely than this from the ravages of parasitic coleoptera, and fully twenty per cent. of all the specimens are found with the lower whorls of the shell filled by a large white larva. Unhappily I never bred this species of parasite, but I am quite certain it is a different one from that infesting the Helicidæ.

Cyclostoma sulcatum (Draparnaud).—A few from the Roman Amphitheatre at Cagliari. I regret that whilst collecting the terrestial mollusca of the above places, I did not devote some portion of my time to the freshwater species, which at Arosa Bay, at any rate, were fairly plentiful. The only fluviatile molluscs, however, I brought back with me were a species of *Planorbis* and a species of *Velletia*, neither of which I have been able to name: these I took in a small stream near Algerciras.

Clausilia bidentata Ström. **with two perfect mouths.** — A specimen of *Clausilia bidentata* with two mouths was found by me at the root of one of a clump of ash trees on the south side of Cave Hill, Belfast. In order to account for the injury to the shell, which has been so strangely repaired, I have watched the cole and blue tits as they searched the trees in quest of their insect prey, and although I have not actually seen them mutilate shells I strongly suspect that this specimen received their attention. I have procured a number of living shells of this species, but the cold weather has prevented them from being active. Later on I intend to submit them when crawling to my caged siskin, in order to observe how they will be received. When active *Cl. bidentata* very much resembles a skip-jack beetle, which the tits are not likely to pass by unnoticed. This specimen might have served as original to Mr. J. W. Taylor's illustration (Monograph Brit. L.F.W. Moll., p. 119.)—HUGH L. ORR (*Read before the Society*, Jan. 10th, 1900).

Note on Eastbourne Mollusca.—*Helix caperata* var. *obliterata* has also been found on the "Victoria Drive," near Eastbourne. *Segmentina nitida* and *Planorbis fontanus* have been found living together in the Pevensey Marshes, and there is a fine colony of *Helix cartusiana* near East Dean on the Downs.—ARTHUR G. STUBBS, Eastbourne, 1900 (*Read before the Society*, Sept. 12th, 1900).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

291st Meeting, June 13th, 1900.

Mr. Thomas Rogers in the chair.

Donations to the Library announced and thanks voted :

Annual Report of the Geological Survey of Canada, vol. 10, 1897 ; Preliminary Report of the Klondike Gold-Fields, Yukon District, 1900 ; Descriptive Note on the Sydney Coal-Field, Cape Breton, Nova Scotia, 1900 (*from the Director of the Survey*) ; Fauna Hawaiiensis, vol. 2, 1900—Mollusca, by E R. Sykes, with intercalations on anatomy, by Lieut.-Col. Godwin-Austen (*from the author*) ; and the usual periodicals received in exchange.

Further Donations to the Fund for clearing off adverse balance announced and thanks voted :

	£	s.	d.
H. C. Burnup	0	5	0
W. L. May	0	10	0

New Member Elected.

Miss Jessie Reeve, St. Mary's Cottage, Gamlingay, Sandy, Beds.

Candidates Proposed for Membership.

Miss Emily P. F. Bury ; and Mr. W. H. Johnson.

Alteration of Rules.

It was announced that at the Annual Meeting the following alterations of rules will be moved on behalf of the Council :—

(*a*). To rule 4 add—"If on December 31st of any year a member shall be three or more years in arrear with his or her subscription, the Council shall erase his or her name from the list of members, and shall take whatever steps seem desirable for recovery of the arrears."

(*b*). In rule 8 for "one year" read "two years."

Papers Read.

"On the Mucus-Threads of naked Terrestrial Gasteropoda (land-slugs)," by H. Wallis Kew.

"Certain Terrestrial Testaceous Mollusca occurring in South-Western Europe," by K. Hurlstone Jones, M.B., R.N., F.L.S.

"Report on the collection of Mollusca formed by Mr. Rupert Vallentin, at Stanley Harbour, Falkland Isles, 1897-98," by Jas. Cosmo Melvill, M.A., F.L.S., and R. Standen.

Exhibits.

By Mr. T. Rogers : A number of marine shells from the Sandwich Islands.

By Mr. Edward Collier : *Helix nemoralis*, *H. hortensis*, and *H. arbustorum* from Miller's Dale, Derbyshire, showing peculiar weathering, probably caused by the unusual heat of last summer.

By Mr. F. Taylor : A keelless form of *Helix lapicida* from Buxton ; *Physa heterostropha* from the canal at Guide Bridge ; *Planorbis dilatatus* from a new locality near Manchester ; *Cæcilioides acicula*, a large series of living specimens from Miller's Dale ; *Melantho decisa* from Brandfort, Ontario. The series of *Melantho* included a fine example of the extremely rare sinistral form.

By Mr. R. Standen : An interesting series of *Neptunea despecta* sent for exhibition by Mr. A. Smith, Hon. Sec. of the Grimsby and District Naturalists' Society. These are identical in form with examples from Kolguev and Spitzbergen, and

more nodose than the usual Norwegian type, and are said to be obtained by the new-fashioned trawls which have been employed since 1897 to fish in the deeper waters of the North Sea. Prior to that time they were not taken by the trawlers, and Mr. Smith is of opinion that this Arctic species is living in the deep waters off our coasts. A remarkable abnormal form of *Buccinum undatum*, taken off the Lincolnshire coast, was also shown.

292nd Meeting, September 12th, 1900.

Mr. J. Cosmo Melvill in the chair.

Donations to the Library announced and thanks voted:

Manual of the New Zealand Mollusca, by F. W. Hutton; Catalogue of the Fossil Bryozoa in the British Museum, vol. 1, 1899 (*Presented by the Trustees*); and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted:

By Mr. A. G. Stubbs: Mounted sets of *Helix cantiana*, *Limnæa peregra* var. *candida*, *Valvata piscinalis* var. *albina* from Litlington, near Eastbourne.

New Members Elected.

Mr. W. H. Johnson, 97, Rumford Street, Chorlton-on-Medlock.

Miss Emily P. F. Bury, 77, Elm Park Mansions, Park Walk, Chelsea, S.W.

Candidate Proposed for Membership.

Mr. W. A. Cockshott.

Resignation.

Mr. W. A. Gain.

Papers Read.

"The geological distribution of British extinct non-marine mollusca," by R. B. Newton.

"Note on *Tapes pullastra*," by B. B. Woodward.

"Albinism at Eastbourne," and "Note on Eastbourne Mollusca," by A. G. Stubbs.

"*Helix arbustorum* at a high altitude," and "Notes from Porthleven, Cornwall," by Rev. J. W. Horsley.

Exhibits.

By Mr. A. G. Stubbs: The series of shells from Litlington, near Eastbourne, presented to the Society's collection.

By Mr. J. R. B. Masefield: Four specimens of *Helix nemoralis* from a garden at Cheadle, Staffordshire. The shells are richly-coloured, and belong to the var. *undulata*, but are unusually thin. As they much resemble specimens from the Cotswold Hills, in Gloucestershire, Mr. Masefield believes them to have been introduced into the locality where found, *H. nemoralis* being very rare for some miles around.

By Mr. J. D. Dean: *Cardium nodosum*, *Aclis ascaris*, *Pleurotoma gracilis*, and other British shells from Barmouth.

By Rev. J. W. Horsley: Land shells from Porthleven and district, Cornwall, including *Helix nemoralis* var. *castanea*, *hyalozonata*, and *albolabiata*; *H. aspersa* var. *undulata*, and *flammea*; *H. virgata* var. *hypozona*, *leucozona*, *alba*, *alba-hyalozonata*, and a fine example of the very rare *sinistrorsa*; *H. acuta* var. *articulata* of unusual size and beauty.

By Mr. R. Cairns: Some very beautiful and rare varieties of *Cypræa*, including a pale *C. reticulata*; forms of *C. cribraria* and allies—*C. cumingi*, *C. peasei*, *C.*

esontropia, *C. gaskoini*, etc.; very fine *C. erosa* var. *nebrites*, *C. lynx* var. *williamsi*, and *C. cruenta* var. *coloba* of a peculiar greenish colour on the dorsal surface, and remarkably bright-orange at the base, all from Aden. The most important exhibit was a variety of *C. helvola*, which corresponds exactly to the description and figure of the newly-described *C. kauilani* of Mrs. Agnes Kenyon, Hawaii (*cf. Proc. Mal. Soc.*, vol. 4, p. 68). In the opinion of many students of the genus this is a mere colour variety, inseparable from *C. helvola*, which in some of its forms possesses the "twin callosities" and tooth arrangement of what should be designated as *C. helvola* v. *kauilani*.

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A Monograph of the Land and Freshwater Mollusca of the British Isles, by J. W. TAYLOR. Part vi., pp. 321–384.

The present fasciculus continues the discussion of the secretory organs, left unfinished in the previous one, and then gives a short account of the structure and formation of pearls. Pigment cells and colouring are next dealt with, and an interesting account is given of the effects upon them of age, food, cold, and heat. Protective resemblance naturally follows, and a large collection is given of instances in which this phenomenon has been more or less clearly demonstrated in the Mollusca, one of the most striking being that of *Helix fusca* to the seed vessels of the red campion. We miss, however, a reference to the likeness of *H. cantiana* to the "fading leaves of the colt's-foot with their autumnal patches of invading fungoid growths," recorded by Mr. Crowther in this *Journal* (vol. 8, p. 161).

The renal organs, pericardial gland, and muscles next receive attention, and under the head of locomotion we have a collection of statistics culled from scattered writings on the speed and strength of different species. The latter half of this part is occupied by a detailed and fully-illustrated account of the reproductive organs, concluding with a brief notice of the embryology. All the important variations in these organs are figured, including the principal types of the *spiculum amoris*. We notice in this section a plentiful terminology of Greek origin, and rather regret that we are not told which of these names, if any, are here proposed for the first time.

Our members will be glad to notice the announcement on page ii. of the cover that "the present part concludes the consideration of the animal and its shell," and that with another "dealing succinctly with the geographical distribution, geological history, parasites, uses, etc., with index and glossary," the first volume will come to an end, and will congratulate Mr. Taylor on being so near the completion of the first half of his arduous task.

The Nautilus, vol. 14, nos. 2-4, June-Aug., 1900.

"Aestivation of *Epiphragmophora Traskii* in Southern California," by Mrs. M. B. WILLIAMSON. "A new species of *Lima*" [*L. hamlini*, Los Angeles, Cal.], by W. H. DALL. "A revision of the *Physæ* of north-eastern Illinois" [4 spp. with figs.], by F. C. BAKER.

"In search of *Polygyra pilsbryi*" [*P. pilsbryi* n.sp., Polk Co., Arkansas], by J. H. FERRISS. "Notices of some new Japanese mollusks" [*Buliminus hirasei*, *B. callistoderma*, *B. extorris* v. *omiensis*], by H. A. PILSBRY. "Supplemental note on *Planorbis corpulentis* Say," by BRYANT WALKER.

"A new *Murex* [*M. petri*] from California," by W. H. DALL. "A new *Lampsilis* [*L. simpsoni*, fig.] from Arkansas," by J. H. FERRISS. "Notices of new

American snails" [*Gastrodonta intertexta volusiæ*, Fla., *Alexia myosotis marylandica*, Md., *Pyramidula elrodi*, Montana, *Helicodiscus eigenmanni*, Texas]. "Description of a land shell [*Eurytus couturesi*, Bolivia, from South America]," by C. F. ANCEY. "Descriptions of new Asiatic species" [*Limnolaria oviformis*, *Buliminus* (*Petræus*) *pilsbryanus*, Aden], by C. F. ANCEY. "Some names which must be discarded," by W. H. DALL [*Argyrotheca* proposed for *Cistella*, *Mazatlania* for *Euryta*, *Cheilea* Modeer to be retained].

The Naturalist, nos. 521 and 523, June, Aug., 1900.

"*Helix lapicida* near Grassington," by Mrs. H. G. BRIERLEY. "*Pisidium amnicum* at Saltfleetby, Lincolnshire," by H. WALLIS KEW.

The Irish Naturalist, vol. 9, no. 8, Aug., 1900.

"*Hydrobia jenkinsi* Smith in south-east Ireland," by R. A. PHILLIPS.

Science Gossip, vol. 7, nos. 73, 75, 76, June, Aug., Sept., 1900.

"Varietal names," by W. M. WEBB. "Mollusca of South Surrey," by the Rev. R. A. BULLEN "*Helix rotundata* monst. scalariforme," by C. S. CARTER. "On colouring of molluscs' shells," by R. J. HUGHES.

The Annals of Scottish Natural History, no. 35, July, 1900.

"*Eledone cirrosa* in West Lothian," by ROBERT GODFREY.

La Feuille des Jeunes Naturalistes, no. 356, June, 1900.

"Liste des coquilles marines, terrestres and d'eau douce recueillies aux environs de Cancale" [concluded, 143 spp. recorded], by H. MARTEL.

Annales de la Société Royale Malacologique de Belgique, vol. 34, 1899.

"Rectification de nomenclature," by E. VINCENT [*Modiola wemmelensis* n.n. for *M. nitens* G. Vincent, *Triton wemmelensis* n.n. for *T. fusiforme* G.V.].

Records of the Australian Museum, vol. 3, no. 7.

"Little-known and undescribed permo-carboniferous Pelecypoda in the Australian Museum," by R. ETHERIDGE [*Stutchburia* n.gen. for *Orthonota? costata* Morris, etc.]. "*Turricula scalariformis*, Ten.-Woods—its occurrence in New South Wales," by C. HEDLEY. "*Scala revoluta* Hedley—its occurrence in Fiji," by C. HEDLEY.

Proceedings of the Academy of Natural Sciences of Philadelphia, part 3, 1899; part 1, 1900.

"Notes on tectibranchs and naked mollusks from Samoa," by C. ELIOT [*Doridium* (*Aglaia*) *Pilsbryi*, *Aplysia* (*Tethys*) *Benedicti*, *Elysia Hendersoni*, nn.spp., fig.]. "A new American species of *Zonitoides*" [*Z. nummus* Texas, fig.], by E. G. VANATTA. "Additions to the Japanese land snail fauna," by H. A. PILSBRY [*Diplommatina tenuiplica*, *Ennea Iwakawa*, *Eulota luna*, *E. aperta*, *E. cavicollis*, *E. rudis*, *Gavesella satsuma*, *G. heteroglypta*, nn. spp., *Eulota gainesi* nn. for *Helix læta* Gld. not Pfr.].

"New and unfigured Unionidæ," by C. T. SIMPSON [33 spp. fig., 12 nn. spp., *Medionidus*, type *U. conradicus* Lea, *Ptychobranchus*, type *U. phaseolus* Hildreth nn. gg.]. "Additions to the insular land-shell faunas of the Pacific coast, especially of the Galapagos and Cocos Islands," by W. H. DALL [24 and 9 spp. respectively, 13 nn. spp.]. "Note on the anatomy of *Guppya Hopkinsi* Dall," by H. A. PILSBRY [jaw and radula figd.]. "Note on the anatomy of the Helicoid genus *Ashmunella*," by H. A. PILSBRY [genital organs of 3 spp. fig., systematic position justified by anatomy]. "Mollusca of the great Smoky Mountains," by H. A. PILSBRY [general characters of collection; *Stenotrema*, key to spp.; 69 spp. recorded, *Gastrodonta walkeri*, *Punctum blandianum*, nn. spp., 8 nn. varr.].

Proceedings of the Davenport Academy of Natural Sciences, vol. 7.

"A shell inscription from Tula, Mexico," by F. STARR.

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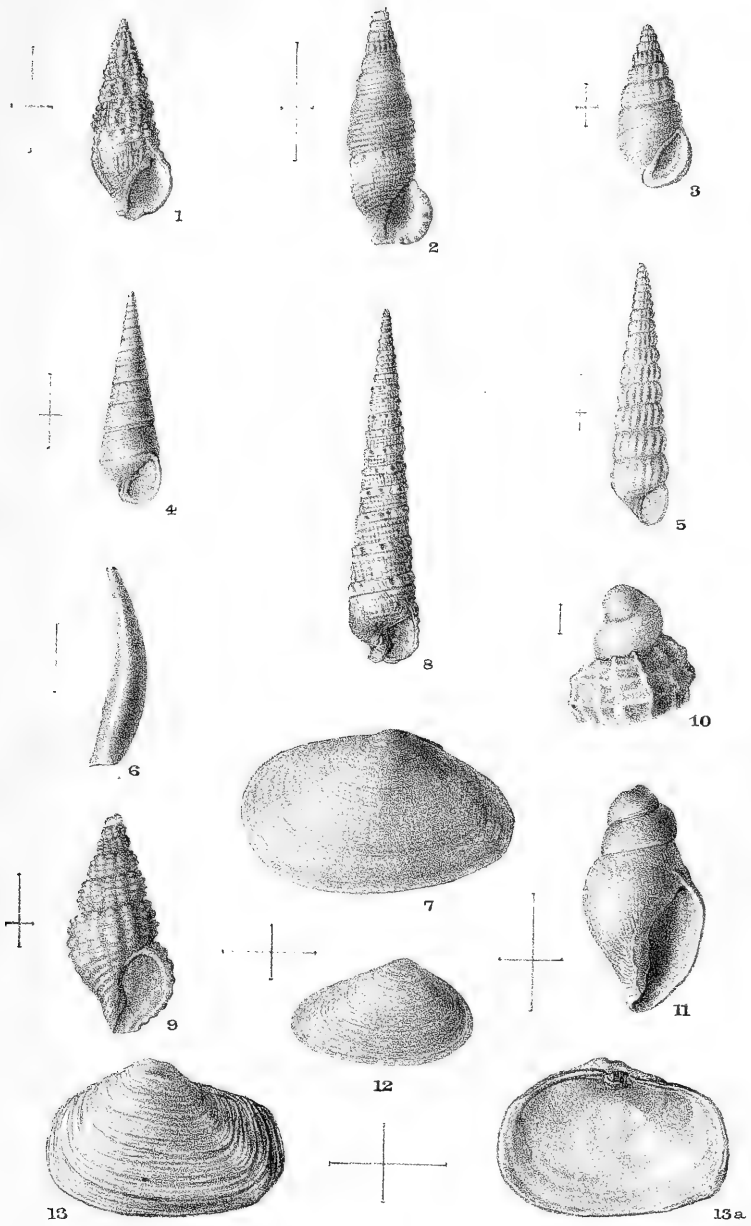
ERRATA.

P. 34. The reference (Pl. 1, fig. 8) belongs to *Terebra* (*Euterebra*) *eximia* Dh.

P. 179, line 21. *For* Derbyshire *read* Denbighshire.

P. 182, line 15. For *Aula* read *Ovula*.



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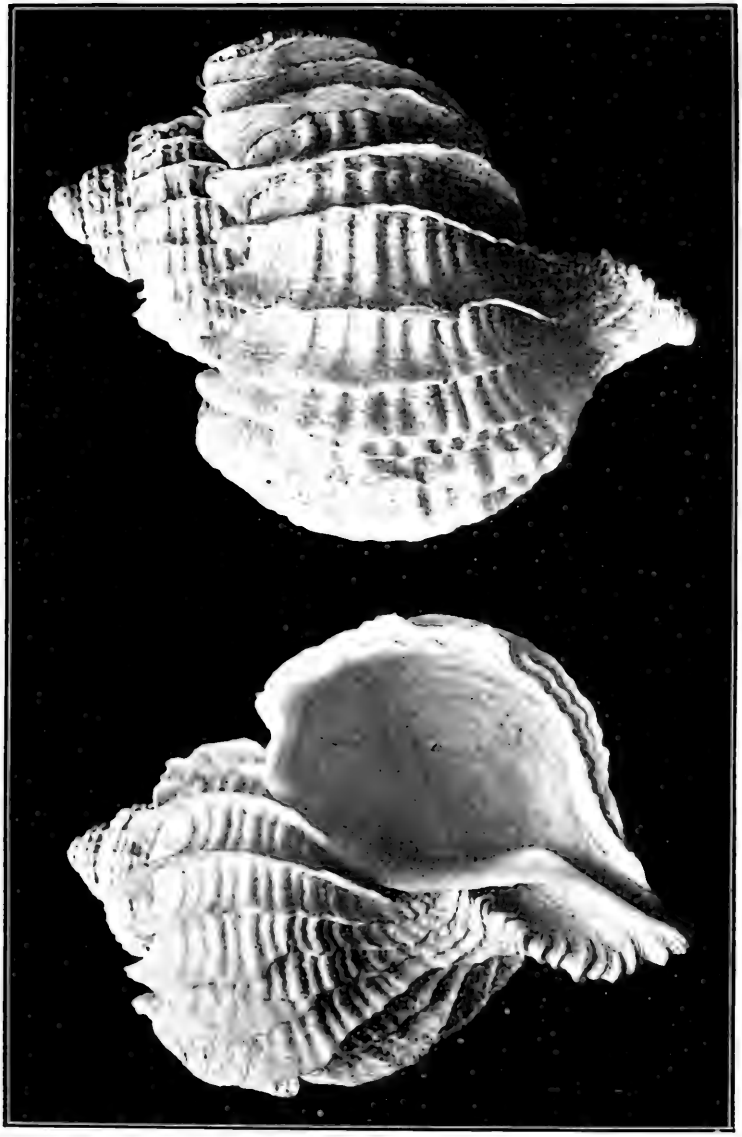


TROPHON GEVERSIANUS.

Drawn by J. W. Taylor, F.L.S.]

[Sketched by L. E. Adams, B.A.

LIMAX MAXIMUS.

EXPLANATION OF PLATE IV.

Abnormal examples of *Planorbis spirorbis* Müll.

Collected by A. G. Stubbs at Tenby.

(See page 106).

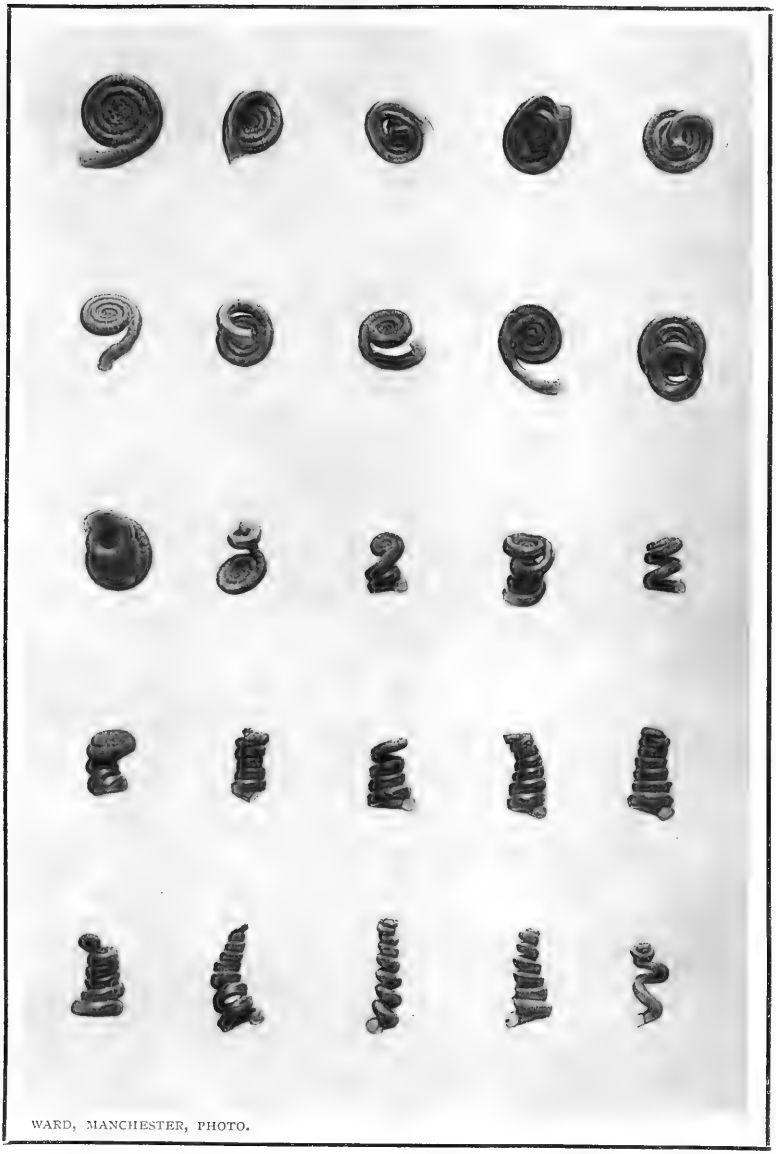
Row 1.—Shells irregular ovals with gaps between the whorls.

,, 2.—Shells normal, except last whorl which is bent away at various angles.

,, 3.—Shells tangled and irregularly knotted.

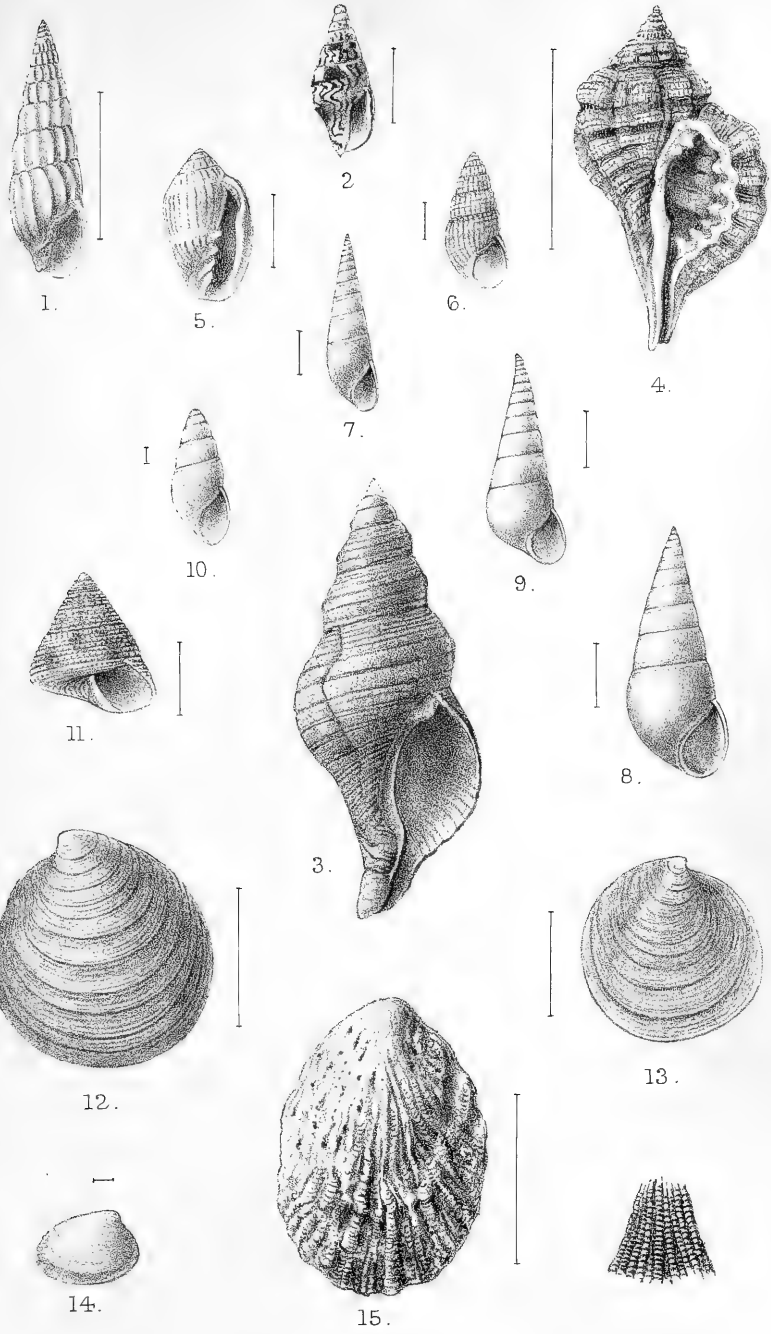
,, 4.—Shells perfectly scalariform and mostly regularly coiled; the first two specimens in Row 5 belong to this form.

,, 5.—Last three specimens sinistral as well as scalariform.



WARD, MANCHESTER, PHOTO.

PLANORBIS SPIRORBIS. MÜLLER.



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Sanguinolaria hendersoni n. sp. (Pl. I., fig. 7).

S. testa tenui, ferè lævi, subnitida, obscurè concentricè inæqualiter striata; valvis posticè et anticè paullulum hiulcis; margine postico subtrapezoide, paullum producto; antico prolongato, rotundato, ventrali rectiusculo; dorsali leniter utrinque declivi; umbonibus lævibus, roseis, cætera superficie pallidè rosea. Long. 23, *lat.* 35 *mm.*

A beautiful addition to a circumscribed genus. To no known species does it nearly assimilate, save in colour, coming perhaps nearest to the West Indian *S. sanguinolenta* Gm., which, however, is far more produced and gaping posteriorly. The type, from Mr. Henderson's collection, is of the dimensions given above, but three other specimens, smaller but quite perfect (long. 20, lat. 32 mm.) exist in J. C. Melvill's collection, which were obtained at a sale at Stevens' auction rooms, in Dec., 1866, without label of locality. We have much pleasure in naming this species after its discoverer.

(To be continued).

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THE PRESIDENT invites Members of the Conchological Society to the Limestone District of North Staffordshire

On SATURDAY, 21st MAY.

Members to meet at Froghall Station on the North Staffordshire Railway at **8 a.m.**, and proceed to Cauldon Low over the Weaver Hills (1,200 feet above sea level) to Oakamoor. If any members cannot reach Froghall so early, or wish to stay over Sunday, arrangements can be made for their accommodation at Cheadle (Staffordshire), or other neighbouring towns.

Members wishing to join the Excursion, will please send in their names *not later than Saturday, 7th May*, to the President,

JOHN R. B. MASEFIELD, Rosehill, Cheadle, Staffs.

He will be happy to give full information as to Routes, Hotel Accommodation, Charges, &c.

The following species of mollusca amongst others are to be found in the locality of the Excursion:—*Azeca tridens*, *Balea perversa*, *Buliminus obscurus* var. *albina*, *Helix caperata*, *H. fusca*, *H. lamellata*, *Hyalinia alliaria* var. *viridula*, *Limnæa glabra* (very fine), *Sphærium pallidum* (*ovale*), *Vertigo pygmæa*.

The district is also one of great interest to botanists, geologists, and entomologists.

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ANNUAL MEETING.

The Conchological Society of Great Britain and Ireland.

THE ANNUAL MEETING

WILL BE HELD AT THE

London and North Western Hotel, Stafford,

On SATURDAY, 22nd OCT., 1898,

And will take the place of the ordinary October Meeting.

PROGRAMME.

4 p.m.—Council Meeting.

4-5 p.m.—Exhibition of Specimens.

5 p.m.—Meat Tea provided (price **2**/- each) for anyone who sends in his name to the Proprietor of the London and North Western Hotel, Stafford, not later than October **19**th.

6 p.m.—Meeting in the London and North Western Hotel, Stafford.

BUSINESS:

Annual Reports and Balance Sheet.

Election of Officers and Council for **1898-9.**

President's Address by Mr, JOHN R. B. MASEFIELD, M.A.,

"The Economic Uses of some British Mollusca."

EXHIBITS:

Members who intend to Exhibit are requested to furnish particulars of their Exhibits and amount of table space required, to Mr. L. E. ADAMS, **68,** Wolverhampton Road, Stafford, not later than October **17**th.

W. E. HOYLE,
Hon. Sec.

THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

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BACK NUMBERS OF THE JOURNAL OF CONCHOLOGY.

THE Society having acquired the stock of Back Nos. of the Journal from Mr. Taylor, the Council has decided to offer them at the following prices :—

Vol. I. (in the event of a sufficient number of orders being received to justify the reprinting of necessary parts) ... ... **21/-** nett.

Vols. II., III., IV., & VII. ... to the Public, **8/-,** to Members, **6/-.**

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The Editor will be glad to receive Communications from Members for this column.

ANSWERS TO ENQUIRIES.

In answer to an enquiry by "L.E.A." in the Journal for April, 1896, as to the derivation of *Azeca*, it may be observed that this word occurs in a list of "Nonsense names" on page 16 of the British Association "Rules for Zoological Nomenclature," drawn up by the late H. E. STRICKLAND (London, 1878).

Helix canigonensis.—Several enquiries having been received regarding the correct spelling of this name, the following extract from a letter from Dr. Raphael Blanchard, who has kindly looked up the original description, will be valuable:—"*Helix canigonensis* a été décrite par Nerée Boubée dans son *Bulletin d'histoire naturelle de France, pour servir à la statistique et à la géographie naturelle de cette région*, page 29, 1833. L'espèce a été trouvée à la base du pic du Canigou (terrain granitique.)"

ERRATUM.

On page 110, line 5, *for* "Worth" *read* "North."

On page 428, line 2, *for* "Ditcham" *read* "Mitcham."

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By Special Invitation the MAY MEETING will be held on Saturday, May 5th, at 4 p.m., at the residence of Mr. J. Cosmo Melvill (see p. 314).

Exhibition of the genus PARTULA at the April Meeting (see p. 315).

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