(9) The Body of Graduates in Convocation assembled to have the power of appealing to the Privy Council, but to have no veto upon the action of the Senate. The Chairman of Convocation to be *ex officio* a member of the Senate.

The Medical Schools will probably require special treatment. Though they might advantageously hand over the teaching of pure science to the University, each school might retain control over its own teaching of medicine and surgery and over the funds devoted thereto.

(10) The Medical Faculty to consist of representatives elected by the Teachers in recognized London Medical Schools.

(11) The recognized Medical Schools to be determined in the first instance by the Commission referred to in Clause (14), but afterwards from time to time by the Senate, subject to appeal to the Privy Council.

(12) A certain number of the members of the Medical Faculty to be nominated University Professors in accordance with the provisions of Clause (4). The number of Medical Professors on the Senate not to exceed one-fourth of the total number of University Professors on the Senate.

(13) A teacher of pure science in a recognized Medical School to become a Member of the Faculty of Science, whenever the appointment to his post is entrusted permanently or *pro hac vice* to the Senate of the University.

(14) To facilitate in the first instance the organization of the University, it is suggested that a small and independent Commission of legal and educational authorities be appointed by Act of Parliament with full powers—

(*a*) To investigate and determine upon the claims of institutions wishing to be absorbed under Clause 5.

(*b*) To arrange for the proper disposal of the trust-funds of those institutions which may be absorbed, and to determine the conditions under which their property shall be vested in the Governing Body of the University.

(*c*) To arbitrate on all matters concerning the interests of existing teachers as affected by the action of Clause (5), and

(*d*) Generally to make such arrangements as may be necessary for the establishment of the University on the foregoing lines.

We are requested to add that the names of those desirous of supporting the Association will be received by any member of the Executive Committee,[1] or may be sent directly to the Secretary (Prof. Karl Pearson, Christchurch Cottage, Hampstead, N.W.). The Association already numbers some seventy members, including Profs. H. E. Armstrong, F.R.S., W. E. Ayrton, F.R.S., F. O. Bower, F.R.S., O. Henrici, F.R.S., E. Frankland, F.R.S., E. Ray Lankester, F.R.S., F. Max Müller, O. J. Lodge, F.R.S., Norman Lockyer, F.R.S., W. J. Russell, F.R.S., W. A. Tilden, F.R.S., H. Marshall Ward, F.R.S., Principals H. R. Reichel, W. M. Hicks, F.R.S., and C. Lloyd Morgan, besides many other names equally well known in literature, science, and art. A complete list will shortly be issued.

[1] This Committee at present consists of the following:—F. V. Dickins, G. Carey Foster, R. S. Heath, E. Ray Lankester, Karl Pearson, H. E. Roscoe, A. W. Rücker, T. E. Thorpe, W. C. Unwin, W. F. R. Weldon.

SUBDIVISIONS IN ARCHÆAN HISTORY.[2]

I. *Subdivisions based on Kinds of Rocks.*

WERNER'S idea that kinds of rocks and grade of crystallization afford a basis for the chronological subdivision of crystalline rocks is more or less apparent in nearly all attempts that have since been made to lay down the general subdivisions of Archæan terranes. The "fundamental gneiss" has gone to the bottom and the thinner schists to the top. There is a degree of truth in the idea. But the assumptions are so great that at the present time little reason exists for the earnestness sometimes shown by advocates of such systems. The idea has little to sustain it in the known facts of geology. The following are sufficient to decide the question.

According to the thorough petrological and geological study of the rocks of the Bernardston region by Prof. B. K. Emerson [1]—a region in the Connecticut valley, in the towns chiefly of Bernardston, Massachusetts, and Vernon, Vermont—there are the following rocks: granite, largely feldspathic; dioryte, so like intrusive dioryte that it had been pronounced trap; quartz-dioryte; granitoid gneiss faintly foliated with biotite and passing into the granite; hornblende schist; quartzyte; quartzyte prophyritic with feldspar crystals; staurolitic and garnetiferous mica schist; hydromica schist; argillyte; massive magnetite, making a bed of magnetite rock; along with coarsely crystalline limestone and quartzytic limestone containing Crinoids, Corals, and Brachiopods: all together making one series of rocks of later Devonian age. My own observations in the region confirm the conclusions of Prof. Emerson. Such facts prove, moreover, that "massive" as applied to crystalline rocks does not signify *igneous*. The granite is not eruptive granite, but part of a stratum which is elsewhere quartzyte, the quartzyte graduating into granite; the latter was never in fusion.

Again: on the borders of New England and New York there are schists of all gradations from massive Cambrian gneiss to Cambrian and Hudson River hydromica schist and argillyte, the age fixed by fossils. Becker reports similar facts from the Cretaceous of California. Such observations, and others on record, make it hazardous to pronounce any gneiss in an Archæan area "fundamental gneiss," or any associated slaty schist the younger of the two. It may be true; but it may not be. It is probable that the thin-bedded schists are absent from the older Archæan, but not that the thick-bedded and massive are absent from the later Archæan.

The little chronological value of kinds of crystalline rocks in the later Archæan comes out to view still more strongly if we consider with some detail the length and conditions of Archæan time.

The earth must have counted many millions of years from the first existence of a solid exterior, when the temperature was above 2500° F., to the time, when, at a temperature below 1000° F.—probably near 500° F., supposing the atmospheric pressure to have then been that of 50 atmospheres—the condensation of the waters of the dense aërial envelope had made such progress that an ocean, moving in tides and currents, had taken its place on the surface.[2] There were other millions afterward along the decline in temperature to the 180° F. mark—180° F. the mean temperature of the ocean—when, according to observations on living species, the existence of plants in the waters became, as regards temperature, a possibility;[3] and still other millions from the 180° F. mark to that of 120° F., or nearly, when marine animal life may possibly have begun its existence. And since cooling went on at a decreasing rate toward the end, time was also long from the 120° F. mark to that of a mean oceanic temperature of 90° F., or below it, when Paleozoic life found congenial conditions in the water. The mean temperature now is about 60° F.

[2] Reprinted from the June number of the *American Journal of Science*, rom advance sheets forwarded by the author. The paper is to be continued in the *American Journal of Science*.

[1] A description of the "Bernardston Series" of Metamorphic Upper Devonian Rocks, by Ben K. Emerson, *American Journal of Science*, III., xl., 263, 1890.

[2] R. Mallet estimated, in view of the density of the atmosphere—over 200 atmospheres to the square inch—that the first drops of water may have been condensed on the earth's surface when the temperature was that of molten iron.—*Phil. Mag.*, January 1880.

[3] They live now in waters having a temperature of 200° F., Brewer, at Pluton Creek, California; 185°, W. H. Weed, Yellowstone Park. Moreover germs of Bacilli have germinated after having been boiled for an hour.

The ocean, sooner or later after its inaugural, began the work of making permanent sediments, that is sediments that were not speedily recrystallized; and these sediments, through the millions of years that followed, must have been of all kinds and of great thickness.

The conditions became still more like the present after the introduction of life with the further decline of temperature. Even before its introduction, iron oxides, iron carbonate, calcium carbonate, calcium-magnesium carbonate, and calcium phosphate had probably commenced to form, for the atmosphere, although it had lost the larger portion of its water-vapour, still contained, as writers on the "primæval earth" have stated, the chief part of its carbonic acid, amounting to all that could be made from the carbon of the limestones, coal and carbonaceous products now in the world. It had also a great excess of oxygen—all that has since been shut up in the rocks by oxidations. And these most effectual of rock-destroying agents worked under a warm and dripping climate.

The amount of carbonic acid, according to published estimates, has been made equivalent in pressure to 200 atmospheres, or 3000 pounds to the square inch. 200 is probably too high, but 50 atmospheres, which is also large, is perhaps no exaggeration. Hence, the destruction of rocks by chemical methods must have been, as Dr. Hunt and other writers have urged, a great feature of the time; and long before the introduction of living species, the temperature had so far declined that the making of silicates must have given way in part to the making of deposits of carbonates and oxides.

But with the existence of life in the warm waters, through the still later millions of years, there should have been, as Weed's study of the Yellowstone Park has rendered probable, abundant calcareous secretions from the earliest plants, and, additions later, through the earliest of animal life. Great limestone formations should have resulted, and large deposits of iron carbonate, and perhaps iron oxides, over the bottom-sediments of shallow inland or sea-border flats, besides carbonaceous shales that would afford graphite by metamorphism.

In fact, long before the Archæan closed, the conditions as to rock-making were much like those that followed in the Paleozoic. Surely, then, all attempts to mark off the passing time by successions in *kinds* of rocks must be futile. Some *varieties* of the various kinds of rocks are probably Archæan only; but not all those of its later millions of years. Even crystalline and uncrystalline may not be a criterion of chronological value. The beds of the Upper Archæan, under the conditions existing, may well, over some regions, be uncrystalline still, and may include carbonaceous shales that hold to this time their carbonaceous products. Such uncrystalline beds may now exist over the Continental Interior; for the great Interior has generally escaped when metamorphic work was in progress on the Continental borders.

The amount of carbonic acid is most readily estimated by first obtaining the probable amount for all post-Archæan sources, and then adding to this that which is indicated by Archæan terranes. The calculation is here given in detail that others may use it for deductions from other estimates.

For the estimation there are the following data. A cubic foot of pure limestone which is half calcite and half dolomite and has the normal specific gravity 2·75, weighs 171·4 pounds; and this, allowing for $\frac{1}{12}$th impurity, becomes 157 pounds and corresponds to 72 pounds of carbonic acid. A cubic foot is equal to an inch-square column 144 feet in height. Since 72 is half of 144, each foot of the column of such limestone contains half a pound of carbonic acid. Hence a layer of the limestone one foot thick would give to the atmosphere, on decomposition, half a pound of carbonic acid for each square inch of surface.

A foot layer of good bituminous coal containing 80 per cent. of carbon, $G = 1·5$, will give to the atmosphere by oxidation 1·9 pounds of carbonic acid per square inch of surface.

If the mean thickness of the limestone over the whole earth's surface, that of the oceans included, reckoned on a basis of $\frac{1}{12}$th impurity, is 1000 feet, the contained carbonic acid amounts according to the above to 500 pounds per square inch, or 34 atmospheres (of $14\frac{3}{4}$ pounds), and if the mean thickness of the coal is one foot, the carbonic acid it could contribute would be 1·9 pounds per square inch. Adding these amounts to the carbonic acid corresponding to the carbon in the mineral oil and gas and other carbonaceous products of the rocks and organic life, supposing it to be six times that of the coal, the total is 513·5 pounds, or 35 atmospheres. The mean thickness of Archæan calcium, magnesium, and iron carbonates is not a fourth of that of post-Archæan. Estimating the carbonic acid they contain and that corresponding to the graphite of the rocks at ten atmospheres, the whole amount becomes 45 atmospheres.

To bring the amount up to the estimate for early Archæan time of 200 atmospheres of carbonic acid, the mean thickness of the limestone for Archæan and post-Archæan time should be taken at nearly 6000 feet.

Part of the limestone of post-Archæan terranes was derived from the wear and solution of Archæan limestones, iron carbonate, &c., and hence all the 35 atmospheres to the square inch were not in the atmosphere at the commencement of the Paleozoic. But if we reduce the 35 atmospheres, on this account, to 25 atmospheres, it is still an enormous amount beyond what ordinary life, even aquatic life, will endure. Reducing the estimated mean thickness for the limestone layer over the globe from 1000 to 500 feet would make the amount nearly one half less.[1]

The making of carbonates early began the work of storing carbonic acid and purifying the atmosphere; and the introduction of life increased the amount thus stored, and added to it through the carbonaceous materials from living tissues contributed to the earthy deposits. But with all the reductions that can be explained, the excess is still very large. It has been proved by experiment that an excess also of oxygen diminishes the deleterious influence of carbonic acid on plants; and that if the amount of this gas is made equal to that of the oxygen in the present atmosphere, plants will still thrive. How far this principle worked in early time cannot be known.

2. *Subdivisions based on Stratification.*

The stratification in an Archæan region affords the only safe and right basis for subdivisions. This method has been used in the separation of the Huronian from the older Archæan; and recently, with good success, by Irving and Van Hise in the study of the Penokee-Marquette region, or the Huronian belt of Wisconsin and Michigan. The intimate relation of the beds in the series has been worked out and their unconformability with the lower rocks thus ascertained, besides the stratification and constitution of the iron-ore series within the belt. This is the first step toward that complete study which should be carried on throughout all Archæan areas, however "complex." The distribution of the rocks and their apparent or real stratigraphic succession, whether massive or schistose, the positions of the planes of foliation or bedding, the unconformities in superposition, and those of mere faulting, and all structural conditions, should be thoroughly investigated. Correlation by likeness of rocks has its value within limited areas, but only after

1 A right estimate is very desirable. If made for North America, it could not be far out of the way to assume it to be a mean for like areas of the other continents as regards the limestone. But with the best possible result for the continents, the oceanic area, three times that of the continents, and out of the reach of investigation as to depths of bottom deposits, remains a large source of doubt.

much questioning.[1] The work is easy in its methods, yet perplexing because in North America the uplifts and flexures of different periods have in general taken place in parallel directions, so that unconformabilities are disguised, especially when the two formations are nearly alike in grade of metamorphism. Follow along the overlying to places where its metamorphism is of low grade, and there may be success.

There is a first point of special importance to be accomplished by Archæan investigation. The Huronian of the Penokee-Marquette region is partially metamorphic. To the east, the iron ore, according to the describers, is mainly metamorphic magnetite and hematite; to the west, especially in the Penokee region, it is largely iron carbonate, or the ore in its original state. Other facts show a diminishing grade of metamorphism to the westward. In the Penokee district, the ore is underlain by a bed of "cherty limestone," the chert of which, like the interlaminated jasper of the iron ore bed, is regarded by Van Hise as probably of organic origin, like later chert. It has among the overlying beds carbonaceous shales containing, according to Chamberlin, 40 per cent. of carbon, bearing thus evidence of very large organic carbonaceous contributions when in process of formation. The great beds of iron ore, the upward gradation eastward in metamorphism, the relations in position to the admitted Archæan adjoining it on the south, seem to prove the Huronian series to be Upper Archæan, as it has been generally regarded, but in a non-metamorphic and partially metamorphic condition. The question thence arises: Are the ore-bearing rocks of the Archæan of Eastern Canada, New York, New Jersey, and other parts of the Appalachian chain, Huronian in a state of *high-grade* metamorphism? Are the chondroditic limestones, which, in some localities, occur in and with the ore, part of the Huronian formation? Does the eastern iron-bearing series rest unconformably on inferior Archæan?

The *Algonkian* (or Agnotozoic) beds belong either to the Archæan or to the Paleozoic.

The Archæan division of geological time is of the same category with the Paleozoic, Mesozoic, and Cenozoic; all are grand divisions based on the progress of life, and they include together its complete range. There is no room for another grand division between Archæan and Paleozoic any more than for one between Paleozoic and Mesozoic. In contrast, the Algonkian division is not above the Cambrian in grade, it being based on series of rocks. Its true biological relations are in doubt, because fossils representing the supposed life of the period are unknown, or imperfectly so. The discovery in any rock so-called of Trilobites, Crustaceans, Mollusks, Brachiopods, or Crinoids, whatever the species, would entitle such rocks to a place in the Paleozoic, and either within the Cambrian group or below it. Walcott has already reported such fossils from the beds at the bottom of the Colorado cañon referred by him to the Algonkian—namely, besides a Stromatoporid, a small Patella-like or Discina-like shell, a fragment of a Trilobite and a small Hyolithes—forms which make the beds Paleozoic beyond question.

[1] As a preliminary in the study of any such region, thousands of dips and strikes of planes of foliation or bedding should be taken (in imitati n of Percival's work before 1842, mentioned in the note on p. 440 of the last volume of the *American Journal of Science*), and all should be plotted on maps of large scale by means of symbols with affixed numbers recording the dips and strikes, for full comparison in the final elaboration. Even the Penokee-Marquette region needs further investigation with a clinometer-compass in hand

Before commencing the study of any crystalline rocks, models of flexures should have been studied until the fact is fully appreciated that a flexure having an inclined axis—the commonest kind—ranges through 180°, or nearly, in its dips and strikes, and until the characters of the bedding in different transverse sections of flexures are well apprehended. A good model for studying flexures may be made from a cylindrical stick of coarse-grained wood having the bark on (if of a smooth kind); it may be about four inches in diameter and twelve to fifteen long. Draw a straight line through the centre of one end; and from this line saw across obliquely to the edge at the opposite end. After planing smooth the sawed surface, the layers of the wood may then be coloured by groups; and three colours, or two besides that of the wood, are better than more. The model of a flexure having an inclined axis is then complete. Cross-sections of the model may be cut and the colours added to the new surfaces. For models of overthrust flexures, this method is not practicable, as wood of elliptical section would be required. They may be made of paper-pulp of three colours.

3. *Subdivisions based on Physical and Biological Conditions.*

Although the physical and biological conditions of the early globe are within the range of observation, there are generally admitted facts which afford a basis for a philosophical division of the time; and from it geology may derive instruction. The subdivisions to which we are led are the following:—

I. The Astral æon, as it has been called, or that of liquidity.

II. The Azoic æon, or that without life.

(1) The *Lithic era*, commencing with completed consolidation: the time when lateral pressure for crust-disturbance and mountain-making was initiated, and when metamorphic work began.

(2) The *Oceanic era*, commencing with the ocean in its place: oceanic waves and currents and embryo rivers beginning their work about emerged and emerging lands, and the tides, the retarding of the earth's rotation.

III. The Archæozoic æon, or that of the first life.

(1) The *era of the first Plants*: the Algæ and later the aquatic Fungi (Bacteria); commencing possibly with the mean surface temperature of the ocean about 180° F.

(2) The *era of the first Animal life*: the Protozoans, and forms related to the embryos of higher invertebrate species; commencing possibly with the mean surface temperature of the waters about 120° F., and ending with 90° F. or below.

The subdivisions, as is evident, mark off great steps in the progress of the developing earth, although the rocks bear no marks of them that can be distinguished.

The Huronian period covered, probably, much of Archæozoic time; and this is all in the way of correlation that can be said. It is well to note here that if the Eozoon is really animal in origin, the "Laurentian" rocks of Canada in which it occurs must be Huronian, or the later of Archæan terranes.

Respecting the Oceanic period it is observed above, "*commencing with the ocean in its place.*" It appears to be almost a physical necessity that the oceanic depression should have been made in the first forming of the solid crust, if the globe cooled to the surface from the centre outward; that is, unless a liquid layer remained long afterward beneath the crust.

The depression was certainly made long before the close of Archæan time. For the enormous amount of rock-making of the Archæan over the continent implies the existence of emerged rocks with reach of the decomposing, eroding, and denuding agencies of the atmosphere and atmospheric and oceanic waters. A submergence in the ocean of 50 feet is almost a complete protection against mechanical and chemical wear. Moreover North America has its Archæan lands not only in the great nucleal mass, 2,000,000 square miles in area, but also in the series of Archæan ranges parallel to the outlines of the nucleus, which extend eastward to the eastern limit of Newfoundland, and westward to the Pacific. And it has correspondingly shallow-water Cambrian deposits lying between these ranges from Eastern Newfoundland and the coast-region of New Burnswick and Massachusetts, westward across the continent about most of the Archæan outcrops, to within 300 to 400 miles of the Pacific Ocean, as shown by Walcott.

There is hence reason for the conclusion that, at the close of Archæan time, the continent of North America was present not merely in outline, but also in general features, and at shallow depths where not emerged.

This fact with reference to North America means much. It means that by the end of Archæan time, the continents generally were essentially in a like condition—outlined and at shallow depths where not emerged; that, therefore, the oceanic depression was then large and deep enough to hold the ocean. Further, this last fact indicates, if the mean level of the continents was coincident with the water's surface, that the oceanic depression had already a depth of 12,000 feet, or that of the present mean depth of the waters; and that the lowering, through later time, of the bed 1500 feet on an average (or 2000 feet according to other estimates) would give the continents their present mean height. And it is a fact of deep geogenic significance, that nearly 1000 feet of this mean height was received after the beginning of the Tertiary.

JAMES D. DANA.

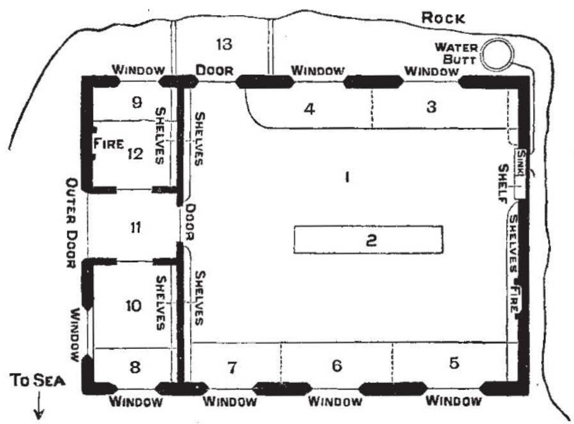
OPENING OF THE LIVERPOOL MARINE BIOLOGICAL STATION AT PORT ERIN.

THE Liverpool Marine Biology Committee, which commenced the investigation of the fauna and flora of Liverpool Bay and the neighbouring seas seven years ago, and has kept up a small biological station on Puffin Island, Anglesey, for the last five years, passed on Saturday (June 4) into a new phase of its existence, and, it may be hoped, a more extended sphere of labour, when His Excellency Spencer Walpole, Lieutenant-Governor of the Isle of Man, declared the new marine laboratory at Port Erin to be open for work. The Puffin Island establishment has been very useful to the Committee, and well worth the small annual expenditure required for its modest outfit. It has been used by a few students who wished to gain a general knowledge of the common marine animals and plants in a living state, and by a limited number of specialists who went there to make observations, or who had the material for their investigations collected there and sent to them. But the Committee has felt for the last year, at least, that a station which was more readily accessible from Liverpool, and with hotel or lodging accommodation obtainable on the spot, would enable their members to do more work, and be of more use both to students and to investigators. Also, it was evident that after five years' work on the shores of the small island the greater number of the plants and animals had been collected and examined, and that a change to a new locality with a rich fauna and a more extended line of coast would yield increased material for faunistic work. On looking round the Liverpool Marine Biology Committee's district, Port Erin, at the southern end of the Isle of Man, at once presented itself as the best available place.

From its position, and the shape of the land, Port Erin has within a distance of a couple of miles in three directions—to Fleshwick Bay, to the Calf, and to Port St. Mary—a long and varied coast-line, with a number of small bays, furnishing good collecting-ground and shallow-water dredging. Two of these bays, Port Erin and Port St. Mary, have harbours with sailing-boats, and face in nearly opposite directions, so that in most winds one or other is sheltered and has a quiet sea. The rich fauna around the Calf and off Spanish Head is within easy reach: at a distance of three to four miles from the laboratory are depths of 20 to 30 fathoms, and at fourteen miles 60 to 70 fathoms. Although it is a considerable distance from Liverpool, still it is reached by a regular service of swift steamers and convenient trains, so that there is no uncertainty or delay in the journey.

The plan of Port Erin shows the position and surroundings of the Biological Station. It is on the beach at one corner of the bay, near where the sand and rocks join, and at the foot of the cliff upon which the Bellevue Hotel stands. It is connected with the road by means of a winding gravel path and steps, and is about a third of a mile from the railway station. It is just at the bottom of the hotel grounds, and arrangements have been made with the proprietor by which those working at the Biological Station can live comfortably and economically at the hotel. The sea comes to within a few yards of the windows, and the bay immediately in front is sheltered pure sea-water with a varied bottom, suitable for small boat dredging and tow-netting; while the rocky coast, extending out towards Bradda Head, has many creeks and good shore pools.

The station is a substantially built, three-roomed house, measuring a little over 30 feet by 20 feet, and standing on a solid stone and concrete platform, which raises it about 10 feet above high tide. It has windows looking out in three directions, north, south, and west. The front door leads into a passage, from which open to right and left two small rooms, which can be used as the Director's room and the Secretary's office, and will also be available for the use of members of the Committee, or any special students who require a separate room for their work. Opposite the entrance is the door into the main laboratory, which measures about 22 feet by 20 feet, and has windows on both sides. In front of the windows run strong fixed work-tables, which will accommodate five students with ease. At the ends of the room are fire-place, sink, tables, bookcase, and abundance



Plan of the Liverpool Marine Biological Laboratory at Port Erin. 1, Main laboratory (22 × 20), with work places for five students; 2, strong table for aquaria; 3 to 9, tables; 10, small laboratory for Director or members of Committee; 11, passage; 12, small laboratory or Secretary's office; 13, small yard.

of shelving, while along the centre runs a strong table for small aquaria and vessels containing animals. A door in one corner opens into a useful small yard between the house and the cliff, in which the concrete fresh water cistern is placed, and where dredges and other implements can be stored.

The Liverpool Salvage Association had kindly promised to lend their useful steamer, the *Hyæna*, to the Committee for four or five days at the time of opening; but as she was called off on duty at the last moment, they sent the steamer *Mallard* instead, on Friday afternoon, across to Port Erin, where she remained until Monday. Dredging trips in the neighbourhood took place on three of the days, and on Saturday evening tow-netting with submarine electric lights was carried on after dark in the bay.

At one o'clock on Saturday the Lieutenant-Governor, the Bishop, the Manx Attorney-General, and a number of members of the House of Keys, and others, arrived at Port Erin, where they were met by Prof. Herdman, Mr. I. C. Thompson, Mr. A. O. Walker, Mr. J. Vicars, Sir James Poole, and others of the L.M.B.C., along with some biologists from elsewhere, the Liverpool party numbering over thirty. The Governor was conveyed to the front of the Biological Station, where, after being presented by Prof. Herdman with the reports upon the