OCTOBER.

The monthly meeting of the Royal Society of Tasmania was held on Monday evening, October 12th, the President (His Excellency Sir Robert G. C. Hamilton, K.C.B.,) in the chair, a large number of ladies and members being present.

The PRESIDENT said before calling upon the Secretary to give a report on the progress of the Australasian Association for the Advancement of Science he was sorry to have to inform the members that Sir Wm. MacGregor had wired to him stating that he would be unable to be present at the meeting to be held in January. His Excellency said he was pleased to say that he had a letter from his friend Sir Robt. Ball, Astronomer Royal of Ireland, who, although unable to be present, had promised to forward a paper to the astronomical section. (Hear, hear).

The Secretary (Mr. Morton) said Professor T. W. E. David, F.G.S., Professor of Geology at the Sydney University, had been asked and had accepted the presidency of the geological section, rendered vacant by the death of Mr. C. S. Wilkinson, and for the geographical section Commander Pasco, R.N., of Victoria, had been appointed. Committees of the various sections had been appointed, and the preliminary programme was now in the hands of the printer, and would be ready in good time. Titles of papers had been received from members residing in the several colonies, and the bulk of most of the papers no doubt would be forwarded during the next few weeks. Mr. Morton referred to the recent meeting of the American Association that had met in the United State and said he hoped that, as at that meeting, at the Tasmanian gathering many ladies would take part, not only in the discussion, but would contribute papers to the several sections. (Hear, hear.) The secretary further remarked that he was pleased to say everything in connection with the coming meeting promised well.

His Excellency said before calling upon Mr. Johnston to read his paper, he would like to say that at the last meeting Mr. Montague Jones had, owing to some oversight, been unable to reply to those who took part in the discussion following Mr. Jones' paper, and he would now ask Mr. Jones to reply.

Mr. JONES said in a discussion which followed the reading of the paper on electric traction Mr. Fincham appeared to associate the "storage system" with the practical operation of electric trams, but it was clearly pointed out that the "storage" up to the present time was an ideal method, and that the "overhead system" was the only one of practical value. The main defects of the former are the limited capacity of the cells, and when brought to bear on a grade of 5 per cent. or over heat instead of current was developed, which buckled the cell plates, rendering them useless, and again, the cells are composed of lead, weighing altogether 3,000lb., which has to be carried about over light as well as the heavy grades, losing 60 per cent of the available efficiency. Coming to the "overhead system," the question of surmounting heavy and continuous grades resolves itself into a question of increased power, which is always to be obtained from the central station, and herein lies the great advantage the overhead system has over any other. All the available energy can be utilised excepting a few point per cent.. due to the resistance of the current by the conductor. The maximum grade in Hobart is 1 in 16, and is slight compared with some of the towns where cars are being operated by electricity. The following is an extract from the directors of the "Richmond Union Passenger Line" to Mr. Sprague:—"The road which you have equipped under most

trying conditions has been one of the most, if not the most, difficult which could be met with in street railway work. The excessive and continuous grades, the numerous sharp curves, the gradients in these curves, the weight of the cars, and the heavy roads which they have been required to carry together with the extent of the system, and the number of the cars in operation (about 40) constitute the enterprise, the largest and most difficult yet inaugurated in any part of the world. We acknowledge the successful fufilment of all the terms and conditions of the contract, and compliment you upon having achieved so signal a success." The number of street electric railways at work, and the number contemplated, is quite sufficient to prove that it has long since passed beyond the experimental stage of development. Citizens of Hobart should keep these facts in view and refuse to listen to any argument stating it to be impracticable to introduce an electric service here; the wretched apology for a permanent way will certainly have to be removed, and a neat steel grooved rail put in its place, as the basis of efficient street transit is a smooth and sound rolling surface. I would also like to see a 4ft. 8½in. gauge, instead of a 3ft. 6in. gauge, as the latter might create mechanical difficulties which cannot at present be foreseen, as all the electric roads, or nearly so, are built to narrow gauge requirements. Of course these difficulties would be overcome; still it is just as well to be on the safe side. As regards a prime source of power for Hobart, it is a simple question of cost and maintenance whether water or steam would be better. There is plenty of water, and the cost to supply a constant head would be, I think, much less than coal. Two hundred h.p. would be more than sufficient force for a service of 12 cars, and as to the mechanical power for equipment it does not make much difference whether the grades be 1 in 5 or 1 in 10, as the motors used are of a standard size, having a capacity of 15 h.p. each. Where the grades do not exceed 4 to 5 per cent., one motor could do the work, but where the grades exceed 5 and run up as high as 10 per cent., then it is unsafe to operate, except by driving both axles, and then the equipment must be two 15 h.p. motors. The average weight for street motors' equipment is about 100lb. per h.p. Hence 2·15 h.p. motor equipment will weigh about 3,000lb. I have deduced this to mathematical formulæ following:—H.P. 4·75=M.T, (C x l), where M miles per hour, T No. of tons, C rise in feet per 100. The cost of single line "overhead" construction, including permanent way material, under average conditions should not amount to more than £3,500 per mile. This, in comparison with the cable system at Melbourne at £34,000 per mile is very marked, and the economy of the overhead system is so manifest that Mr. Henry Peabody, of Boston, wrote to me as follows, in reply to inquiries:—"There is a feeling among all Municipal Councils, where railways apply for 'overhead lines,' that the increased economy warrants their asking for a decrease of fares, hence their desire to keep quiet about their balance-sheets." Mr. James asked me to explain the Telpherage system. There are two, "the series" and the "cross ones parallel." The latter is now being operated in many places. The skips or trucks are suspended from an iron rod supported by poles, and the rod acting as a conductor, is constructed on the "break and make" principle at every 120ft. or so, taking its supply of current from a dynamo fixed at a convenient place. The "makes and breaks" are normally closed, so that a current of electricity may flow from end to end, but when the first wheel of the skip of a train touches the "break" the circuit is closed and the currentruns back to the last wheel of the train, and into the skip containing the motor and thereby energising the train. The same operation to continues at the intervals stated the end of the journey. It can be worked up to 15 miles per hour with ease, and the cost of carrying is about 1s. 2d. per ton per mile. Unlike most new inventions "Tel-

pherage" does not persist in adhering to any principle of an obsolete type, but is an innovation so extraordinary as to pass all practical experience. As feeders to the West Coast lines nothing could be more admirable, and not as the remote future we shall see it universally adopted, instead of those useless unpayable lines and costly roads that cripple the revenue of new countries.

Mr. W. F. Ward (Government Analyst), said he did not intend to say very much, as he had expressed himself at a previous meeting. He would, however, say that he entirely disagreed with the views put forth by Mr. Power.

Mr. Alfred J. Taylor, F.L.S., read the following paper, entitled "Notes on the Shell-mounds at Seaford, Little Swanport."—Among the many interesting relics of the aborigines of Tasmania that yet remain, not the least interesting are the shell-mounds that mark the spot where they formed their encampments and feasted before the intrusion of a white race had disturbed their simple and peaceful modes of living. Such shell heaps as that to which I am about to refer occur in other parts of the world, and for some time they were supposed to be nothing more particular than ordinary "raised beaches." Even now in Tasmania there are many well-informed people who cannot bring themselves to believe that the shell heaps noticeable in many places on our shores are the kitchen-middens, or "refuse heaps," of the aborigines of the colony; and it is for the information of such sceptics that I place on record the following evidence as establishing beyond all reasonable doubt the fact that they are this, and nothing more. One has only to examine these remarkable accumulations to obtain evidence of an intensely interesting and convincing character, and the results of a personal examination of the extensive shell mounds to be found on the estate leased by Mr. Samuel Drake at Little Swanport have induced me to hope that a few notes on the subject may be of some interest to the fellows of this Society.

Mr. R. M. Johnston said he was very pleased to find Mr. Taylor had taken so much trouble in obtaining such valuable information dealing with the aborigines of Tasmania. The paper read by Mr. Taylor was extremely interesting from an ethnological point. He (Mr. Johnston) had paid considerable study to the working out of the shell deposits, and on a recent visit to the place referred to in Mr. Taylor's paper he had observed the remains of charred wood, proving that the great deposits of shells had been made by natives, and were not formed by other agencies.

Mr. E. D. Swan said some years back Mr. Mitchell, who resided on the East Coast, had, at a meeting of the Society, spoken on this matter, and had been told by the natives themselves that they had de posited the oyster shells that formed the extensive deposits.

Mr. Morton said the paper read by Mr. Taylor was a most important one from an ethnological point, the specimens collected being exceedingly interesting. Although there was a difference of opinion still existing regarding these shell deposits, from what he himself saw he could arrive at no other conclusion than they at one time were formed by natives. Although Darwin in his work "on the structure and destruction of coral reefs and geological observations on the volcanic islands," page 258, states that during his visit to Tasmania he examined several of the shell deposits, and was of opinion that while some of the mounds may have been formed by the aborigines, the greater number of these deposits he considered had been caused by a small elevation of the land. Captain Grey and other travellers have found in Southern Australia upraised shells, belonging either to the recent or to a late tertiary period. The Rev. W. B. Clarke found proofs of the elevation of the land, to the amount of 400ft. at the Cape of Good Hope. Darwin says that when visiting Tasmania he was assured by an intelli-

gent farmer that oysters were formerly abundant in Ralph's Bay, but that in the year 1834 they had without any cause disappeared. In the "Transactions of the Maryland Academy," Vol. 1, Pt. 1, p. 28, there is an account by Mr. Ducatel of vast beds of oysters and clams having been destroyed by the gradual filling up of the shallow lagoons and channels on the shores of the United States. Darwin, when visiting New Zealand, says he observed in the neighbourhood of the Bay of Islands, that the shores were scattered to some height, as at Van Diemen's Land, with sea shells which the colonists attributed to the natives. He (himself) was of opinion that the land had been elevated. The bone Mr. Taylor had been fortunate to obtain from the shell deposits clearly showed that it had been made by the natives, and was a most valuable relic.

Mr. A. J. OGILVY drew attention to some caves at Rocky Mouth that he had visited, and had been dwelling places of natives. On examination he felt sure many interesting relics might be found.

Mr. TAYLOR, in reply, said he felt very pleased at the great interest his paper had caused, and promised to lay before the Society any further information he might obtain, and also he would be pleased to present to the Museum any specimens he might have in duplicate.

Mr. W. A. WEYMOUTH exhibited a magnificent collection of Tasmanian mosses collected and mounted by him. The collection consisted of many species, Mr. Weymouth kindly promising to present a mounted set to the Museum.

Capt. SHORTT, R.N., also exhibited a choice collection of photographs of the "milky way and nubecutœ," taken at the Sydney Observatory, 1890.

THE EARTH'S CRUST.

Mr. R. M. JOHNSTON, F.L.S., read a paper entitled "Observation on the Causes of Elevation and Subsidence of the Earth's Crust." He referred to the difficulties of dealing with a subject which necessarily rests so largely on arbitrary values for unknown data, and stated that as this was so it was obvious that any view he might tend to favour must in his own mind be attended with a large measure of doubt, and on some obscure points his judgment must be suspended entirely. As a novel theory, however, has recently been referred to by Mr. F. Danvers-Power relating to the elevation of mountain chains, he entered more fully into the consideration of those hypotheses of causation which have gained the most favour among physicists and geologists. He divided his paper under the following heads:—Formation of continental areas and ocean basins; contraction theory; the alleged expansion and contraction of the underlayers resulting from a rise or fall of temperature caused by the loading or unloading of the areas affected; expansion and contraction of the underlayers resulting from a rise or fall of temperature; Mr. Danvers-Power's reference to the supposed influence of the pressure of ocean waters upon the formation of parallel mountain chains; and concluded with the thought that good reasons had been given for rejecting the theory put forward by Mr. Danvers-Power.

His EXCELLENCY, in moving a vote of thanks to the authors of the papers, Messrs. Johnston and Taylor, said that although Mr. Ward had spoken strongly against the views expressed by Mr. Danvers-Power, in a paper contributed by that gentleman at a former meeting, the fact of having Mr. Power's paper had been the means of causing Mr. Johnston to read a most valuable paper. With regards to Mr. Taylor's paper he was of opinion that that gentleman deserved the thanks of the Society for the very valuable information he had obtained.

The meeting then closed.

NOVEMBER—NO MEETING.