Royal Society of Tasmania.

ABSTRACT OF PROCEEDINGS.

MAY 8th, 1906.

The first meeting of the present session of the Royal Society of Tasmania was held in the society's rooms on May 8 in the presence of a large and fashionable audience. Among those present were His Excellency and Lady Edeline Strickland, Mr. George Browne, I.S.O., Private Secretary, Lady Chelmsford, Sir Elliott and Lady Lewis, the Premier and Mrs. Evans, the Mayor and Mrs. Crisp, Colonel and Mrs. Mackenzie, the members of the Council of the Royal Society—Messrs. A. G. Webster (chairman), R. M. Johnston, I.S.O., Bernard Shaw, I.S.O., Russell Young, G. E. Moore, M.H.A., Hon. Dr. G. H. Butler, M.L.C., Professor Neil Smith, M.A., Colonel W. V. Legge, R.A.—Hons. W. H. Burgess, N. Ewing, C. E. Davies, M.L.C., Mrs. Davies, Miss Marie Davies, Senator Dobson, Dr. Gerard Smith, Mr. P. S. Seager, Professors McDougall and Ritz, etc., etc.

The Secretary (Mr. Alex. Morton) presented His Excellency with a handsomely bound volume of the proceedings of the Royal Society, and read apologies for non-attendance from the Venerable Archbishop Murphy (written in a beautifully clear and legible hand), and Mr. T. Stephens, M.A., F.G.S., one of the vice-presidents of the society.

Drs. F. A. Rodway and R. D. Campbell, and Mr. P. Lockwood, were then elected members of the Royal Society.

While the ballot was proceeding, the secretary drew attention to a fine water-colour painting which had just been received from New Zealand, of the Notornis Hochstetteri, the Takahe of the Maori. This, the secretary explained, was the rarest of existing New Zealand birds, and was considered to be extinct until the capture of a specimen in 1898, of which this was a drawing. The first living bird was caught in 1847 in Dusky Bay. Soon after a second was obtained in Thompson Sound. Both were now in the British Museum. A third was captured near Lake Te Anau, and was now in the Dresden Museum. The bird was flightless, and its nearest ally was the Pakeko (Porphyrio melanotus).

His Excellency then delivered the following presidential address:—

"SOME DEVELOPMENTS IN 1905-6 CONDUCIVE TO TASMANIAN PROGRESS."

Mr. Vice-president, Ladies, and Gentlemen,—It devolves on me, as president of the Royal Society, to open the proceedings of a new session with an address of a scientific character, and I propose, on this occasion, to bring to your notice a few of the discoveries and developments of the year 1905-1906, which have some bearing on the future progress of Tasmania. The beginning of 1905 witnessed a continuing rise in the price of tin, copper, and other metals, which was then full of hope; few, however, expected that the increase would continue, and that exceptionally high prices should be sustained for so long a period. Believing, as I do, that the progress of Tasmania in the near future is closely connected with mining, the causes of the high price of copper and tin invite inquiry. It should be noted that these prices are given in terms of gold, and as the supply of gold from South Africa and other sources has been rapidly increasing, it would appear that, to some extent, the exchange value of gold has depreciated, rather than that the prices of copper and tin have appreciated. This circumstance modifies, to some extent, all other explanations. Nevertheless, the explanation which is commonly accepted to account for the high price of copper, is the rapid development of electric tramways, telegraphs, and other industrial undertakings, for which copper is still without a rival. This industrial development no doubt exists, and is likely to continue for some years at a rapid rate, but it is not sufficient to account for the upward movement of price. It is stated that China has been issuing a new copper currency which has absorbed no less than 60,000 tons of copper in the period under review. Silver blocks called "shoes" change hands by weight in China, and it is, therefore, probable that a considerable amount of the copper coinage will every year be dealt with as metal, and worked up into trinkets and articles of domestic use, thus adding to the permanent demand for copper. Nevertheless, the bal-

ance of evidence appears to show that the demand for copper has been exceptional, and it can hardly be hoped that its price will continue quite as high as it is at present. With regard to tin, the increase in price has been more remarkable, and there are strong reasons to hope that the increase has come to stay. This is a subject of the greatest importance to Tasmania; it calls for a careful analysis by experts, rather than the passing attention that it is here possible to bestow upon it. The physical properties of tin are remarkable. Its intrinsic value is great on its own merits, which is more than can be said for silver. Tin, as an alloy with copper to produce gun metal, and tin for soldering, has to be purchased, practically regardless of price, as there is no available substitute. With reference to the remarkable properties of tin when alloyed with copper, experiments have recently been made in which these metals have been combined in varying proportions to re-discover the truth or otherwise of the tradition that the bronze tools of the ancients could cut stone as readily as steel, with the result that alloys have been produced from tin and copper which are as hard as steel. They are, however, very brittle, and too expensive to be commercially useful. The greatest demand for tin is for the coating of thin steel plates so largely used for enclosing preserved foods, jams, etc. Although the present high price of tin has brought about the establishment of works for saving the tin from scrap and from old pans and other receptacles, this recovery is very limited, and it is obvious that much of the tin put on the market gets dissipated and lost for ever. Tin, therefore, differs from other metals in the extent to which it is worked up again to keep up the supply of the world. Tasmania is fortunate in having large deposits of tin, both in the original rock matrix and in alluvial deposits. The methods of recovering tin at small cost have been wonderfully developed. Hydraulic dredging has now been brought to such a stage of perfection that tin-mining in Tasmania, at present prices, must go up by leaps and bounds, and continue for generations. One of the reasons given to account for greater supplies of tin not being forthcoming from the Straits is that the supply of Chinese and similar labour is not as easily procured as formerly. It is said that the mortality exceeds 50 per cent. when it is attempted to open up bush land in Banca and Billiton, similar in character to the land heretofore productive of tin. With reference to gold-mining, the erection by the Tasmania Gold-mining Company of two sets of pumping plant equal to the largest in the world deserves special mention. This plant will make it possible to follow the reef of the Tasmania mine to a depth of probably 2,000ft. Although improvements in detail have been effected in the methods hitherto known for extracting metals, no new process of importance appears to have been discovered in 1905-6. The West Coast of Tasmania is reaping great benefits from the operation of smelters under a system in which the sulphur in low-grade ores is made to act as fuel to facilitate their reduction. By the adoption of this system on a large commercial scale, vast quantities of low-grade ore, too poor to pay for transport outside Tasmania, can now produce rich returns. It is reported in America that by very high temperatures obtained electrically, gold, copper, and silver have been distilled; that is to say, boiled off in vapour, and the vapour re-condensed into liquid metal. This achievement may open a way to separate certain complex ores, which have defied all previous efforts.

The adaptation of the steam turbine for marine propulsion has made enormous strides in the last year. Tasmania is closely connected with this development, inasmuch as the steamer Loongana, built for the Tasmanian trade, was the first turbine steamer to cross the equator, and her voyage out from Glasgow to Australia, with one stop, at the high speed of 15 knots, and her subsequent performances have done more than any other achievement to silence the strong body of conservative engineers and owners of special machinery for constructing reciprocating engines, who have been proclaiming that the turbine is an experiment, and a wasteful application of coal. At low and moderate speeds, that is to say, at speeds below 14 knots the turbine at present does waste coal; but as the speed increases, the relative mechanical efficiency of the turbine increases in comparison with the efficiency of the reciprocating engine. It appears to me that this remarkable advantage of the turbine may be largely accounted for by the fact that in a turbine the back thrust of the screw propeller is nearly balanced by the forward thrust of the steam against the blades of the rotating rings, and consequently the extravagant internal friction of the reciprocating engine, which becomes enormous at high speed, is absent in a turbine-driven steamer. There has been a phenomenal development in the manufacture of gas and oil engines. This is so pronounced that factories in this line have been working day and night in England to meet their orders. Very simple appliances have been developed, by which a gas engine makes its own gas from coal or charcoal. This system has

already been applied to sea-going craft; a marine gas-driven engine of 500 horse-power is under construction, and a 1,000 horse-power plant is designed. It appears that these producer-gas plants will render inestimable service to the mining industry of Tasmania wherever water is scarce, and I venture to suggest that these advantages have not received the attention which they deserve. In the railway world, the past year has been remarkable for the building in England of the largest possible engines that could be safely got through existing tunnels and stations. Speeds of 70 miles an hour have been recorded, and maintained with safety. At the opposite end of the scale comes the railway motor-car. Its advent is no longer an experiment, it solves the problem of maintaining traffic at reasonable expenditure on railways built through districts of which the passenger and goods traffic is too small to be remunerative under the present system of working. These railway motor carriages have not yet been introduced in Tasmania, where the opportunities for their employment are so evident that it may be a penny wise and pound foolish policy to delay their introduction. In the development of motors for use on common roads, it may be noted that the steam car has been defeated in the struggle for supremacy by the petrol engine. This is largely due to the great improvements in the construction of the explosion engine, and to the methods discovered to vary the speed of these engines, otherwise than by gearing.

The Panama Canal is an undertaking, prospectively, of great importance to Tasmania. The completion is very far off, and very sanguine people think it may be constructed in 12 years; nevertheless, the steps that are being taken to achieve success deserve our attention. The Government of the United States has made this canal a national enterprise. After law and order had been established in the canal zone, the American Government proceeded to exterminate the yellow fever mosquito, and to carry out other sanitary reforms which have made Panama and Colon possible places for Europeans to live and work in. In fact, it is more than probable that Panama, which has for generations had the reputation of being in the most deadly zone of the tropics, will soon become a model of sanitation, thanks to the combination of modern science and the uncompromising methods of American administration. President Roosevelt appointed a technical commission, on which he associated with the leading engineers of the United States the greatest experts the world can furnish in canal construction. This commission has recently presented its report, and, to the relief of those genuinely interested in the success of the Panama Canal, the majority reported in favour of a sea-level canal; but, if the newspapers are to be credited, the President of the United States supports strongly the recommendation of the minority, which is in favour of a canal with a series of locks. The work of excavation at the higher levels which is being done at present on the Panama Canal will be equally useful whichever project is finally adopted. A canal comprising a series of locks and lakes offers the advantage—which is, probably, only an estimated advantage—of taking shorter time to build. It also makes it easier to dispose of the flood waters of neighbouring rivers. On the other hand, a canal with locks would become useless as the result of even slight shocks of earthquake, which would cause the locks and dams to leak. When a dam, holding back a large volume of water, begins to leak the chances of the gap widening and the whole work being carried away are appalling. Well-wishers of the Panama scheme desire that it should be, as far as possible, immune, both from accident and from destruction by design, and that the canal should therefore be cut down to the sea level. The importance of this canal to the whole of Australia generally, is immense. The commercial aspect of the canal is, perhaps, but a secondary question side by side with its strategic importance. When the time comes for a struggle between the white and yellow races for the mastery of the Pacific, Anglo-Saxon America, with Anglo-Saxon allies, will be sure of victory if fleets can be concentrated by the use of the Panama Canal; those who study with earnestness the future of a white Australia should welcome every step in this great work. From the commercial point of view the Panama Canal will add to the natural advantages of Tasmania's commercial position, and by offering new markets for Tasmanian apples, and more speedy transport, this new outlet will relieve the anxiety of those who think that too many orchards are being planted—an anxiety which I do not share.

Professor Milne, the best-known authority in the world on earthquakes, has recorded the opinion that there are about thirty thousand earthquakes in the world every year. Some of these are, of course, very faint, and are only recorded on delicate instruments; but it is pleasing to note that the comparative immunity from serious earthquakes enjoyed by England is also enjoyed by Tasmania. There is little doubt that the principal cause of earthquakes is the shrinkage of the world as it gets older and colder; this causes disturbances of the crust, and there is reason to believe that the countries, such as

Tasmania, which were volcanic in a comparatively recent geological period, and then became quiescent, are nowadays the most immune from earthquake shocks.

Recent progress in the commercial utilisation of waterfalls is very remarkable. The rush to harness what is left of the Falls of Niagara has been frenzied, and the disappearance of the Falls is as well in sight as any disappearance can be. From this Tasmania may draw a useful lesson. The utilisation of the power available from the Great Lake is a topic which has been often mooted. I am inclined to think the time has come when it should receive greater attention, and when efforts should be made to attract capitalists to take it in hand. The idea should be dispelled that any big lake provides water-power as a matter of course; this is not so. There are big lakes elsewhere, like Lake Tchad and Lake Tanganyika, that are growing smaller instead of keeping their level. What provides water-power is a large catchment area at a suitable elevation in a country with a reliable and sufficient rainfall. These desiderata are present in Tasmania. We have, moreover, a climate in which a manufacturing population can thrive and work to the best advantage, and the facilities are numerous where factories could be erected in close proximity to deep-water harbours. The transmission of electricity from the centre of Tasmania to the Coast does not present insurmountable engineering difficulties, if sufficient money is forthcoming. The commercial aspect of the question is not, however, encouraging, if calculated on present demands for electrical power; but it may be noted that the same diffident view was held with reference to the first Power Supply Company established at Niagara. The proverb, "that money makes money," finds its counterpart in the fact that power brings power, by attracting people to itself, in order that it may be utilised. The local press has, within the past year, published a most interesting suggestion for working the Tasmanian railways by electricity, although it may be regretted that the scheme lacked details as to the cost of converting the rolling-stock, and gave no prominence to the fact that, while electricity is much cheaper than steam traction for a frequent train service, the use of steam is cheaper where trains are few and far between. The application of electric power for unwatering mines, such as the Tasmania mine at Beaconsfield, is not impossible, and I trust that many other mines on a par with the Tasmania will be discovered, and that they will furnish tempting propositions for electric power from the Great Lake.

With regard to telegraphy, I desire to notice a portable telephone instrument developed by a Tasmanian, and shown at the military camp at Ross on Easter Tuesday. The apparatus has the great merit of the thorough working out of detail seldom seen at the first exhibition of a new instrument. By its means any standing run of ordinary telegraph wires, or fencing wires, can be used as a connection for reliable communication for a distance equal to the breadth of this State. With regard to wireless telegraphy, I note with regret that Australia appears to be backward and apparently reluctant to face this problem with the characteristic enterprise which this young community shows in other paths of progress. Within the year under review messages have been sent by wireless telegraphy from England to Port Said, and ships crossing the Atlantic have been in constant communication with the shore, and able to issue a daily paper on board. I firmly believe that, with the use of wireless telegraphy, messages could be sent to England at a shilling a word, and that the cheapening of telegraph rates would be an inestimable boon to Australia. The rate of transmission of wireless telegraphy has been increased from fifteen to thirty words a minute over moderate distances. Type-setting by telegraphy has reached the stage of commercial development, but I hope the time is far distant when our Tasmanian newspapers will be set up in type to one same order by an operator sitting in a bush capital. In electric lighting, Japan, a country very like Tasmania in its physical features, has made such progress as to light cheaply, not only its important towns, but also its villages, by electricity. In this line of enterprise Launceston has set an example to Australia, which would do credit to any city in the world. It behoves other centres of population in Tasmania to follow this good example. The use of electricity in the manufacture of steel has been developed to the extent that it is now commercially remunerative where electrical energy is available at the price of £10 per horse-power. This calls for attention, because in Tasmania we have abundance of good iron ore, and a reasonable hope that an electrical horse-power could be obtained at a figure far below £10. I may be allowed on this occasion to repeat my congratulations on the completion of the Denison Canal and of the Stanley breakwater, which I also had the pleasure to open within the last year. These works draw attention to the growth in the size and depth of modern steamers. These are increasing with marvellous rapidity, a rapidity which is alarming to most harbour trusts, but enables us to rejoice in the fact that Hobart offers, and will offer, apparently, for endless ages, deep water berths un-

rivalled in the rest of Australia. The necessity by which harbour authorities all over the world are being pushed to provide wharfage for large draught steamers will, undoubtedly, increase the demand for heavy piles, such as were supplied from Tasmania for the Dover harbour works. Trade in these piles is worth studying, by looking for orders wherever a large new harbour is projected. It is easier for Tasmania to hear that a new harbour is projected than for the contractors to know how easy it is to procure in Tasmania piles of extraordinary length, strength, and specific gravity.

In shipbuilding an effort is being made to regain for the English mercantile marine the primacy as regards speed which now belongs to Germany, and considerable progress has been made in the building of two great steamers for the Cunard line, which will be 785ft. in length, and with a guaranteed speed of 24½ knots. There is reason to hope the guaranteed speed of these gigantic turbine steamers will be substantially exceeded. For the first time in history the number of steamers on the English register surpasses the number of sailing ships. The conclusion of the war between Russia and Japan has taught many lessons in the art of war. The Defence Forces of Tasmania have already adopted in details of tactics, uniform, and entrenchments some of these lessons. The war in the East has thrown light on many scientific problems of general interest. On land, prominence was given to the importance of railways in any scheme of defence, and it appears that a country not likely to be attacked for a long time might well spend money intended for future defence on strategical railways, having at the same time a commercial value. On the sea the modern design of battleship was tested in practice. It was shown that larger ships are required to keep the sea efficiently, to carry many long range guns, and to have a margin of stability after being hit by a torpedo. These lessons have rendered the greater part of the navies of the world obsolete. It was also shown that a large fleet is worthless unless it is kept in the highest state of repair, that no guns, explosives, or "materiel" is worth having which is not the very best, and that enormous dockyard resources, with skilled workers in constant employment, must be at hand to any fleet worth having. The importance of the torpedo-boat has been greatly discounted; these craft did not save Port Arthur, or sink a single Japanese warship. It appears that ships struck by Japanese torpedoes were repaired by the Russians, and brought back into the fighting line, and that the effect of the blow of a torpedo is purely local on the structure of a ship. It was shown that life on torpedo-boats and destroyers is so hard that a large sea-going fleet in constant training is necessary from which to recruit crews physically able to keep to the sea in torpedo-destroyers, and to fight such craft at night and in bad weather. Crews unaccustomed to fight in uncomfortable weather were shown to be at the mercy of an enemy accustomed to the sea. The advantage of superior speed was shown to give choice as to the place where decisive actions are to be fought by battle fleets. The designs have been published of a turbine-driven torpedo, with a speed of thirty-five knots. The British Admiralty are projecting 20-knot submarine boats. No more powerful means for harbour defence has yet been devised. The salvage operations of the Japanese, by which they raised from the deep several battleships and cruisers are amongst the most instructive lessons of the war. It appears that there are no specially equipped salvage steamers stationed in Australian waters, although the volume of shipping is great and increasing. The success of Japan in raising a whole squadron of wrecked shipping may be an incentive to establish salvage companies in these waters. Hobart would be an inviting centre for such an enterprise, in view of our magnificent harbour, and its convenient position between Australia and New Zealand. The inclination to sell their navies—comprising several powerful ships of recent date—on the part of the South American Republic, tends to prove the proposition that all second-class navies are not worth maintaining. Notwithstanding the futility of its mismanagement, the concentration of a Russian fleet in the Sea of Japan, at a distance from its base in Russia of more than half the circumference of the world, has put an end to the theory that distance is any protection from naval attack. The supremacy of the sea now belongs to the nation that can build fastest, and has the greatest number of building slips and yards for vessels of the largest size. On this ship-building standard the supremacy of England is undeniable, and it does not appear that it can be seriously challenged for half a generation.

In scanning the political horizon for facts that can be dressed in a scientific garb, a prominent place is due to the visit of General Booth to Tasmania, which has drawn attention to the Imperial aspects of the emigration question. With masterly ability, and with an organisation suited to the needs of the multitude, General Booth has made the Salvation Army the greatest and most scientific emigration organisation for receiving emigrants at the end

of their journey that the world has seen. The entente cordiale between England and France in politics has developed the entente municipale and the interchange of hospitalities on a vast scale between parliamentary and municipal representatives of English and French politics, and interchange of visits by large parties of workers crossing political borders has established the germs of an international procedure, from which some hope may be drawn for an era of universal peace, and for some movement towards the general reduction of armaments. It has been realised in England as well as here that single member constituencies produce startling anomalies, and a very disproportionate representation of the will of the people. Theoretically, no greater service could be rendered to the democracy than by devising and enacting a satisfactory system of proportional representation. Tasmania has in the past been foremost in giving an example in this line of progress, and the question is one which may again deserve attention on scientific grounds. The proposal to build a railway to the summit of Mount Wellington is a step in the policy of advertising Tasmania and its peerless climate, which my Ministers have as closely to heart as I have myself, and the Tasmanian Tourist Association may be congratulated in the application of science in its methods. In conclusion, I venture to hope that this Royal Society of Tasmania may, in the session now opened, contribute its share of work, in its special sphere, towards the advancement of the progress of this community.

Mr. R. M. Johnston, I.S.O., F.S.S., said it was generally supposed that the Royal Society was limited to the consideration of topics dealing with natural history, and he had often been reproached with having introduced questions of an economic character, which were regarded as outside the society's work; but he thought that the varied interests of man were as much entitled to their serious consideration as the vagaries of a bacillus, and he was glad, therefore, that His Excellency had drawn attention in his address to a number of matters which affected Tasmania in many direct and indirect ways. In considering the question of price of tin, to which His Excellency had referred in his opening remarks, they must remember that that was determined by the cost of production at the worst advantage. He was glad to say that there was a prospect of the poorer tin fields, which were of such vast extent in Tasmania, being made profitable, from which great benefit would result to the State. His Excellency had referred to the great progress that had been made in various ways. This led him to think of the tremendous progress that had been made by England during the past century, at the end of which she had a population of £2,000,000, far better clothed and fed than when the population was very much smaller. This was the result of the great discoveries that had been made, which had annihilated distance and time, and brought the producers and the consumers closer together.

Senator Dobson then moved a hearty vote of thanks to His Excellency for his interesting address. Whenever His Excellency addressed them they could not but realise what an intelligent interest he took in all that affected the well-being of the island. His Excellency had shown them how very many important affairs going on in the world affected Tasmania, either directly or indirectly. He quite agreed with what His Excellency had said as to the necessity of having the very latest ships for their naval defence. He was glad His Excellency did not share the pessimistic views as to there being a slump in the fruit market. He (Senator Dobson) had been pessimistic once, but was so no longer. No industry here had succeeded so well as the fruit industry, and though the other States were vieing with us, we should remember it was Tasmania who pioneered the market, and showed that apples could be transported from one end of the world to the other. He had always thought that England was first as a builder of ships, but he had recently seen an article showing that Germany was on a par with us, both as to the speed and size of the ships she built, and as to the perfect mechanism of the machinery. He was glad that His Excellency had referred to the projected aerial railway to Mount Wellington. He believed that it would be a great success, that it would attract tourists from all parts of Australia, and that it would prove to be an advertisement worthy of our Yankee cousins.

The vote of thanks was carried by acclamation, after which those present were entertained in the trophy-room by the members of the Lady Hamilton Literary Society, and a very enjoyable half-hour was spent.