well. I found I could steer my course by this map; all the portages, channels, etc., are marked upon it, and I could practically go into an unknown country without a guide, and make my way by the aid of this map alone. The topographical work of the map is admirably done, and the geological work in the lower part of the region is quite as admirable. I found a few places, however, here and there where blunders had been made in the geology, especially in marking the contours of the various formations.

This whole region consists of two great groups of rocks - Laurentian and Huronian. On the map the Laurentian rocks are colored pink, and the Huronian green. The special rock which is of interest to us is the green one, called by Lawson the Keewatin, in reality a member of the Huronian series, so far as one can judge from its general associations. The other rocks are Laurentian granite, gneiss, and rocks of a similar description. For several reasons this region is one of the most interesting in the world from a geological point of view. I shall give you one. We find the gneissoid Laurentian rocks, not generally looked on as eruptive, coming up through the green Huronian schists, which at one time probably formed a great sheet covering all the rocks beneath. These Laurentian bosses have thus enfolded between the schists, and in consequence wherever you go in that region you find the latter nearly perpendicular, a fact of great importance to the district as a mining one. These green rocks—green on the ground as well as on the map—have proved to be the most interesting from the mineralogical standpoint. They consist of hornblende schists, chlorite schists, and a mixture of these and a number of associated rocks. In many parts these schists contain veins of quartz, which in the majority of cases are bedded veins. True fissure veins, *i.e*, those which cross the strike, are rare. As a rule bedded veins are not so continuous or so certain as ore bodies as the other kind.

One of our first efforts was to see the only mine working in the region, the Little American. This is situated on a small island, not larger than the site of these Parliament buildings, in the state of Minnesota, three miles south of the international boundary line. They had reached a depth of only 45 feet when I visited it, but there is an admirably equipped 5-stamp mill at work actually turning out bricks of gold at the present time. The mill, though small, is very well arranged.

There is no geographical or other reason why the international boundary should mark the limit of gold bearing rock, and I am convinced that there are as valuable properties, and probably much more valuable ores, north of the line. At the Little American I was shown a brick consisting of about $500 worth of gold, which was the result of about 48 hours' work and the product of about 30 tons of ore. I was told that the yield is about $20 of gold per ton, but I think this estimate a little high, and that $16 or $17 per ton would be more nearly the truth. There was also on hand about half a ton of concentrates that would run between $320 and $350 per ton, which I was informed they intended to ship away for treatment. A large part of the ore is of the free milling kind, notwithstanding that the sulphides come very close to the surface in this region, scoured as it has been by the ice of the glacial period. The decomposed, rotten quartz so common in other districts has been all scraped away. Part of the gold is held in the sulphides and will be refractory. However, $16 per ton will pay, even if the concentrates be neglected altogether. I believe the Little American has paid from the start. On the strength of this mine a "city" of 300 inhabitants has sprung up. On the Canadian side there is a mine called the Little Canadian, on a still smaller island, which may prove to be a producer like the other, but we could not examine it to any advantage.

A good deal of prospecting has been done. We visited Seine river and Seine bay; along part of the latter a large number of iron locations have been laid out. The ore is magnetite. We examined one or two of these locations; whether they will amount to much in the end or not, one cannot say, but should a railway pass through the district they may prove of considerable value. A large number of gold properties have been located along Shoal Lake, and one of the most interesting of them is on a spot, which on Lawson's map, is marked gabbro. I disappointed the gentleman who owns it, Mr. Thomas Wiggins, very deeply by telling him his mine was in granite, for he was in the full belief that it was in gabbro. There the veins are true fissure veins and can be traced for a mile. The largest one is 5 feet wide at some points. A little development work is being done, and I understand the mine is turning out very well. There is probably a continuous body of ore and a valuable property here. It is not very usual to find rich gold-bearing rock in granite, but the granite here must be looked on as an eruptive rock, deriving its gold from the surrounding schists.

Our next expedition was into the Pipestone Lake region, whence we portaged over to the Manitou district. We went north of the country shown on the map, where we found segregation or bedded veins enclosed in the green schists just as below. No claims have yet been taken up here, but there are a number of veins, and probably something of importance may turn up. In the Manitou section a good deal has been done, and a few claims worked to the depth of 15 or 20 feet. Some extraordinarily rich specimens come from the upper part of Manitou Lake; whether the deposits will hold out in depth of course one cannot say. There are some true fissure veins 6 or 8 feet wide at points, so that there is plenty of material, and in places it is very rich. Only one mine was being worked at the time of my visit. It had a considerable body of quartz, and carried free gold, as I saw with my own eyes.

I visited the famous Atik-okan iron range, where there is certainly a large body of ore. Some of it will probably prove to be of Bessemer quality, but other portions of it contain sulphur.

The whole trip meant 1,000 miles by canoe, and consumed nearly three months' time. We brought back a large amount of material which we intend to have assayed to ascertain what are the relationships of the gold-bearing veins to the surrounding rocks. We have samples from veins that occur in granite, in gneiss, in various sorts of the green schists, and we wish to settle if we can whether or not there are horizons at which gold is more commonly found. One definite result already arrived at, is that over a region 200 miles long and 50 miles or more wide, every here and there free gold is found in the rock. I think the majority of the veins will not justify large development work. It is my opinion that a custom mill in the Rainy Lake region and another in the Manitou country might serve a good purpose and open up a very important field. Many of the mines might be small and would not warrant the erection of a stamp mill, but they might well repay the cost of taking out the ore, if it could be treated at a custom mill, because it is rich. Some of the mines will probably prove to be be large and continuous and will justify expense. The ore in general appears to be free milling, although a considerable quantity is retained in the sulphides and will have to be treated accordingly. One interesting fact is to be noted, wherever you find galena you find free gold. What the relationship between the two is I have not worked out, but this appears to be the case and is borne out by my own observation as well as by the testimony of explorers. Some better mode of access to the region is required. It is very difficult to get into the Manitou district, though that lake is only 30 miles from the C.P.R. Six portages have to be crossed, one of them a mile long. You cannot take mining machinery over that, and some improvement will have to be made before the region can be developed at all. There is probably as great an area of the gold bearing formations north of the C.P.R. line as there is south, and prospectors are just beginning to go in there. It is to be borne in mind that Rainy Lake is a large body of water, and has a coast line almost as long as that of Lake Ontario. This fact very much facilitates travel and exploration. (Applause.)

The Hon. A. S. Hardy Elected an Honorary Member.

Mr. Kingsmill moved, seconded by Mr. J. M. Clarke, that the Commissioner of Crown Lands, the Hon. A. S. Hardy, be elected an honorary member of the Institute.

THE CHAIRMAN in putting the motion, remarked that since the present Commissioner of Crown Lands had taken office there had been more interest taken in mining by the government, and a greater advance on previous legislation had been made than at any previous time. The present mining law, though not incapable of improvement was, as he had stated elsewhere, perhaps the best worked out law and the most liberal in its provisions of any on the statute book.

HON. MR. HARDY—Mr. Chairman I certainly had no expectation that this honor would be conferred upon me this evening when I ventured to intrude upon you. I can only thank you for the very complimentary resolution that has been moved, and the very kindly manner in which it has been carried. What I am afraid of is, that I shall hardly be able to bring myself within the terms of the by-law, or the conditions under which it may be applied. Perhaps, however the position which I hold may act as sponsor for me in the matter, for I fear this is the only way in which I can claim to be a fit and proper candidate for honorary membership in your association. I am pleased to be present at this meeting of your Institute. I know it is not what is called a mining convention, but it is perhaps built on a more solid foundation, and fitted to discuss matters more carefully and satisfactorily. I am pleased, sir, to hear some of the remarks which you yourself made. When you stated that we in Ontario have had more mining legislation during the past five years than for the previous twenty, I accept it as acompliment, not merely to myself but to the officers of the Department, and indeed to yourself as well. We have had many pressing invitations from you, sir, to even more active legislation. Perhaps my own connection with mining has been confined too much to legislation. I have been compelled to leave the practical and scientific work of the Department to other hands; but in Mr. Blue and his assistants we have a body of men earnest and euthusiastic in pursuit of the duties devolving upon them to whom these interests may very safely be committed.

The Government have put in a consolidated form the entire mining law and regulations, established a Bureau of Mines, imposed working conditions on those who acquire mining lands from the Crown, introduced the leasing system by which land may be obtained on easier terms and at a lower cost, lowered the minimum area of mining locations, and adopted the plan of staking out claims, of which you, Mr. Chairman, were so enthusiastic an advocate. We have endeavored to assist the mining industry by aiding railways on a considerable scale, and are now attempting to help on the work of development by means of a government diamond drill. We have adopted all the methods of assistance that were fairly within our power, even to the extent of establishing summer mining classes, and of making a grant of $125,000 to encourage the opening up of our iron mines. It would be difficult to ask a Legislature in four or five years to do much more or go much faster. With all the advances we have made in this line there is in the mind of anyone perhaps only one drawback—the imposition of a small royalty on ores. This may be claimed by some to stand in the way of mining development, but perhaps the taxpayers will be strongly inclined to support it.

It will afford the Government pleasure to be of any assistance to you as an Institute. The rooms in these buildings will always be open for your meetings, and any other facilities which we can offer you are at your disposal. Meetings of this kind are one of the means by which our mining industry will be ultimately developed. That it should be so slow of development seems a marvel to some of us. Our lives are passing away, but the mining industry is not making the progress or producing the wealth as rapidly as we would like. It can hardly be expected that the Government will pour out money to bring about the dovelopment of the industry, but whatever will increase the desire of mining men and capitalists to go into the mining business may be legitimately expected from the Government; beyond this, and perhaps the opening up of roads and waterways, I do not know that you can expect the Government to go.

The education of the country in mining matters must come from bodies such as this. I am glad to know of its existence, and heartily wish it prosperity. I again thank you for the honor you have done me in making me an honorary member of your Institute. (Loud applause.)

Deep Water-Ways Convention.

ALDERMAN J. E. THOMPSON, on behalf of the Committee of Arrangements, extended a cordial invitation to the Institute to send delegates to the Deep Water-Ways Convention to be held in Toronto on 17th September and following days.

MR. J. J. KINGSMILL, seconded by the Secretary, proposed the following delegates:—Mr. A. Blue, Director of Mines; Dr. Coleman, School of Practical Science; J. Bawden, Kingston; J. J. Kingsmill, T. W. Gibson, R. W. Prittie, J. M. Clarke and T. D. Ledyard, Toronto.

The Delegates being approved the Secretary was authorized to issue their credentials.

Next Place of Meeting.

PROF. NICHOL, inviting the Institute to Kingston for its next meeting, said he was quite sure the Faculty of the School of Mining would do everything possible to make the meeting a success.

MR. J. BAWDEN having seconded the invitation, the Secretary was authorized to convene the next meeting at Kingston in January, 1895, at such time and place as seemed most suitable by the Kingston members of the Institute.

A vote of thanks to the Chairman having been passed the meeting adjourned.

Nickel Steel—In the course of a paper lately read, on "Nickel," before the Society of Arts, London, the author, Mr. A. G. Charleton, A.R.S.A., mentioned that it was not till 1779 that it was recognised as a metal. The growth of production and of consumption have been slow, but of recent years its uses as an alloy have attracted the attention of metallurgists, and as a result of experiments many important adaptations have been discovered. Mr. Charleton states that whilst 1,000 tons of nickel flooded the market in the early years of the century, 10,307,375 lb., or, roughly, five times as much, was produced in 1891, consequently the large excess of metal produced must have gone into nickel steel, yet this alloy has scarcely begun to be used in the arts of peace. As its price tends steadily downwards, he confidently expects that it will eventually enter into competition with other materials for other purposes than armour plates and guns. The ordinary carbon steel used for steel propeller purposes, has a tensile strength varying from 60,000 lb. to 65,000 lb. per square inch, whereas the nickel steel shows a tensile strength of 90,000 lb. per square inch, the elongation in both cases being about the same, 20 per cent. Use of this stronger steel will warrant boring ont the shaft, materially lessening the weight whilst preserving its efficiency, and such cored shafting can be hollow forged when the hole islarge enough, to admit a mandril. If it is found possible to apply it to the constructi on of boilers the tensile strength of nickel steel being 1½ times that of ordinary steel, it will enable their thickness to be reduced one-third, effecting a saving in weight, which is a great consideration.