

## DISCUSSION ON "NEW SOUTH WALES TIMBERS," AND "THE TRANSVERSE STRENGTH OF AUSTRALIAN TIMBERS."

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MR. HENSON considered Professor Warren's paper was a valuable sequel to Mr. Maiden's which gave the means of identifying various timber, and Professor Warren's showed the value of them for building purposes, particularly as it bore reference to the time of felling and seasoning, which, he gathered from the latter part of the paper, had great influence upon the use and strength of the timber. Some specimens shown at the last meeting looked well, taking into consideration that they had been so long in position; and he had no doubt that this was due to their seasoning. He had seen some specimens of timber extracted from one of the first bridges built in the colony, and they were all remarkable for their hardness, particularly the Box (a specimen of which he had), also the Turpentine, which appeared to have been cut from very large trees. He was under the impression that Mr. Maiden had not referred to the She-oak in his paper, and this timber should have had some consideration paid to it, as it possessed some very good properties. He had seen She-oak, taken from the roofs of old houses, which had shown a very good state of preservation; also Ironbark shingles, which, after thirty years, had the inside quite good and unimpaired. He would like to have seen some records of microscopic researches into Australian timbers. The splendid exhibit of timbers shown at the last meeting had impressed him with the idea that the Association ought to have an exhibit of the various iron products of the colony, which would make a fitting sequence to this.

Mr. Trevor Jones was impressed with the value of Professor Warren's paper. The subject of timbers was very important, timber entering as it did into so many of our structures; and Professor Warren had given such a clear explanation that engineers could apply the tests. If young engineers did not study these papers, they

would be out in the cold in the future ; as engineers would be called upon for a special knowledge of the value of our colonial timbers. He did not quite agree with the statement as to the best time for felling trees so as to produce the best results ; because it was a matter of doubt even now, in the colonies, as to which part of the year was the best for the purpose.

Mr. W. G. Wilson said he remembered seeing a quantity of timber (he thought in 1856) which had been unsuccessfully tried for veneering, etc., so often, that the attempt to use it profitably had at last to be abandoned, and he would like to hear some authoritative statement as to tests for the proper ascertaining of the shrinking and warping properties of our timbers.

Mr. W. H. Wells said he had had some experience with timber structures, and would offer a few remarks as to some woods, which had come under his personal notice. Ironbark he considered the best timber in the colonies for girders, and piles ; he had seen piles taken out after thirty years' service with the portion below the earth as perfect as when it was placed in position : Stringybark, as a girder, was also a first class timber. Spotted gum for such uses as planking, etc., above ground was a good timber. Blood-wood was another excellent timber for piles and when left above ground, but would not bear much beating. Red-gum was useful for girders, but of no use for flooring, etc., as it frayed away and split up, both of these operations being very much facilitated by the traffic over it. Blue-gum was a capital timber all round. Messmate (a bastard between Red-gum and Box) was of no use whatever. No mention had been made in the papers of soft woods. Brush-woods, such as Myrtles, were of no use, as they were liable to dry-rot, and could not stand the slightest strain. He could quite endorse the statements made that the quality of timber differed according to the quality of the soils in which it had grown. Spotted and Blue-gum grew well in mountainous districts, but the reverse was the case with regard to Ironbark. In the northern districts, on the flats, Ironbark grows well and in these localities Spotted-gum will not or does not grow. The best time to cut timber is when the sap is down ; that is, in

the winter; he had inquired of old timber-getters and they had been unanimous in recommending winter. Engineers should clearly distinguish between timber which was useful above ground and that which was serviceable when buried. She-oak was utterly useless as a constructional timber.

Mr. H. Kidd had hitherto taken little notice of the subject under discussion, except as to English timbers. Some reference had been made with regard to identifying the various kinds of Australian timbers, and this he considered a very difficult matter. He had experienced some difficulty in determining upon delivery whether timber was of the variety which had been ordered. He knew of sleepers at Johnstone River, Queensland, which had a life of only three years, on account of the moisture of the country.

Mr. W. Cruickshank would not take up time by expressing the general feeling of thanks for the valuable papers, which had been contributed to the records of the Association. He had recently read Professor Warren's book, and it seemed to him that the compressional stress differed very little, whether it was one or a number of feet. He was quite sure that these papers were very valuable to men who devoted their attention to this branch, and they were also interesting to iron and steel engineers; individually, however, his knowledge of timber was limited; but attention having been drawn to it, he hoped it would be the means of awakening greater interest in it. One matter in connection with the subject impressed him, and that was, the large amount of uncertainty, which, in his opinion, was due to there being so many tests. No reference had been made to the most approved and modern means of preserving timber, and this was a grave omission. In England and the continent, a large amount of money had been spent in devising means by which timber might be preserved. In 1851, and for years after, the Engine Board imported Baltic timber which had been put through processes of preservation. These importations lasted from twenty to thirty years, and he believed that a great many of the railway people in England put all their constructional timber, such as sleepers, telegraph poles, etc., through a most lasting process of preservation by an injection

of the heavy oils of tar. For many years carbolic acid was esteemed to be the greatest antiseptic. The Egyptians possessed a remarkable knowledge of preservation of various things, and it had been proved, he thought by Dr. Pettigrew, that the process they used was not a coating, but a system by which the ingredients penetrated through the whole body, and this had been ascertained by splitting the heart of a mummy which had been embalmed some thousands of years. Whether they had applied the same process or art to timber was unknown. Returning to the preservation of timber in England, he instanced a piece of timber taken out of the "Royal George" which, after a submersion of nearly eighty years, was found in a most exceptional state of preservation; but, upon exposure, it turned quite green. Heavy oils were the best preservatives, their boiling-point rising from 400 to 700 degrees, whilst 300 degrees was sufficient to decompose timber. In felling trees as at present carried out, any persons could cut where and when they liked, and this should be remedied by Legislative enactment, which should also make it incumbent upon a person who felled a tree to plant another.

Mr. W. Shellshear had during the last few years devoted a great deal of attention to the timber bridges of the colony, and he found that when coated with tar they completely perished. This might be attributed to the tar attracting the sun; but he was unable to say. The form of decay in such cases was a turning into loose fibre, which could easily be teased out, the dry-rot and white ant completing the process. In places where moisture can accumulate and be retained the dry-rot will quickly take hold. Thus, many of the bridges in the colony, where a road is carried on the top of them, require great attention. At Penrith the iron girders were placed on a series of ironbark supports, and on the side where the sun never shone the timber was completely rotten; but the other side, which had the sun, was perfect, with the exception of one or two pieces. With regard to piles he found that they invariably went between wind and water; that is, they would perhaps decay to the extent of three or four feet underground, and below that be perfectly sound.

Mr. W. H. Wells said the difference between Peppermint and Ironbark was very difficult to determine, especially if the bark was off both timbers.

The President congratulated the Association upon having such interesting papers contributed to the Association. He felt that Professor Warren had given information to the Association which, in his whole experience, he (Mr. Nelson) had never been able to acquire. In the past it had been the custom, when a question rose, simply to take your own experience, or that of some one else whose larger experience might be a better guide. Mr. Jones had said it was to the interest of young men to take keen notice of papers such as these; but he could go further and say it was absolutely necessary for the whole body of engineers to take such notice, and to profit by the valuable information open to them. Many of the remarks made by Mr. Maiden he could endorse from his own practical experience. He had been brought up as a practical millwright, and in the bush had not only to use the timber, but also fell and square it. He trusted the time was not distant when both Mr. Maiden and Professor Warren would again contribute the results of their valuable researches to the Association.

Mr. Maiden said the President had regretted that Teak was not mentioned. He had brought with him three pieces, and he would be glad to know if either of these agreed with the Teak which the President had spoken of as being a good wood for gearing, etc. He had not mentioned She-oak, because he had to draw the line somewhere among the three hundred or more different useful woods. Of course he could not give such authoritative data concerning our timber as they could in Europe, where, in Constantinople, there was a tower built of Cypress which had been under observation for 1,000 years. The best time to fell timber could be ascertained only by such data as Professor Warren's, who, with the Victorian Timber Board, had recorded these particulars with much precision. His experience was that the best time to cut timber was when the sap was loose. He could promise to show any engineer the timbers spoken of by Professor Warren.

With regard to Red-gum, there are eight or ten species of trees growing in different localities which are so called. He would impress upon his audience the value of conciseness in obtaining and recording information. Recently in the compilation of a book, he had been obliged to throw away valuable facts, laboriously gathered, because of their defects in this particular. Colonial Pine grew best in mountainous country, and was, as a rule, very short grained. The determination of Ironbark was effected usually by means of injection.

Professor Warren said that with regard to the preservation of timber, nothing had been done in New South Wales, but they had made a start in New Zealand. He noticed that timber coated with tar decayed much more rapidly than when untarred; the reason of which was obvious, the tar preventing the moisture from getting out, and dry-rot consequently developed itself. Red-gum was a very variable timber, but was not, taking it all round, so strong as Ironbark. Jarrah was a very valuable timber, and was indigenous to Western Australia. Victorian Red-gum was as heavy as Ironbark.