

*Highway Construction in Wisconsin.* By E. R. Buckley, State Geologist of Missouri. Pp. xvi+339. (Published by the State at Madison, Wis., 1903.)

THIS book forms part of the Economic Series of works published by the State of Wisconsin, and is an evidence of the trouble that is taken in the United States to furnish the officers having charge of the various departments with the fullest information as to their work that is available.

It contains eight chapters, relating respectively to the classification of highways, and the agents that destroy pavements; materials used in improving highways; methods of constructing different kinds of pavements; drainage; pavements constructed in the larger cities; abrasion and cementation tests.

In the introduction the writer points out that a purchaser or seller who is separated from a railway station by ten miles of good roads is actually nearer his market than the person who is separated by five miles of unimproved roads. Good roads mean heavier loads, more rapid transit, and a longer life for vehicles and horses.

That such a work as that now under notice is urgently required in the State of Wisconsin may be inferred from a further statement made by the author, that a dog is able to draw a load to market in many European countries which a horse cannot draw in the United States, and that up to the present time highways in Wisconsin are simply narrow tracks connecting different parts of the country, the one idea of construction being to fill the gullies and level off the roadway with such material as might be closest at hand.

There is some useful information contained in the book as to the tests carried out by the State for ascertaining the relative wearing values of different kinds of stones used in road-making, from which a lesson might well be learnt by the county councils in this country as to the advantage to be gained by maintaining an establishment for supplying their road surveyors with trustworthy data of this character.

There is one kind of pavement in use in some of the cities that might with advantage be used in this country, that is, blocks made of asphalt and laid in the same way as granite pavings. This pavement is stated to be non-slippery, while at the same time it is noiseless and non-absorbent. The cost is about the same as sheet asphalt.

*Practical Chemistry.* Part ii. By William French, M.A., F.I.C., and T. H. Boardman, M.A. Pp. xiii+126. (London: Methuen and Co., 1904.) Price 1s. 6d.

THIS book contains a well arranged series of experiments of a kind suitable for young students who have already spent a fair amount of time at practical chemistry. The physical properties of gases, the laws of chemical combination, sulphur and its compounds, some nitrogen compounds, and carbon and its simpler compounds, are among the chief subjects included in the volume.

*Marsh-Country Rambles.* By Herbert W. Tompkins. Pp. xi+307. (London: Chatto and Windus, 1904.) Price 6s.

MR. TOMPKINS confines his rambles, with few exceptions, to the marshlands east of the road which leads from Prittlewell to Maldon and Colchester, and south of the road from Colchester to St. Osyth. He does not pretend to offer the reader detailed descriptions of villages and towns, but rather to provide an interesting narrative in which history and legend are incidentally touched upon. With the exception of a frontispiece the book is not illustrated.

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## LETTERS TO THE EDITOR.

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### The Occurrence of Thorium in Ceylon.

THE Government of Ceylon determined last year to carry out, with the cooperation of the scientific and technical department of the Imperial Institute, a systematic survey of the economic minerals of Ceylon. Mr. A. K. Coomaraswamy and Mr. H. G. Parsons were selected to conduct the survey in Ceylon, and to dispatch specimens of the minerals found to the Imperial Institute for chemical examination and commercial valuation. Among the specimens thus received were those of a mineral existing in small black cubical crystals found in the refuse from gem washings near Balangoda, in the Sabaragamuwa Province, which had been identified by Mr. Holland, a resident in Ceylon, as probably uraninite or pitchblende. The same mineral has been since observed by Mr. Coomaraswamy in a vein of pegmatite at Gampola, in the Central Province of Ceylon.

The specific gravity of the mineral was found to be 9.32, and an analysis by Mr. G. S. Blake, of the scientific staff of the Imperial Institute, furnished the following results:—

		Per cent.
Thorium oxide	... .. ThO <sub>2</sub>	76.22
Cerium oxide	... .. CeO <sub>2</sub>	...
Lanthanum and didymium oxide	... .. La <sub>2</sub> O <sub>3</sub> Di <sub>2</sub> O <sub>3</sub>	8.04
Zirconium oxide	... .. ZrO <sub>2</sub>	trace
Uranium oxide	... .. UO <sub>3</sub>	12.33
Ferric oxide	... .. Fe <sub>2</sub> O <sub>3</sub>	0.35
Lead oxide	... .. PbO	2.87
Silica	... .. SiO <sub>2</sub>	0.12
		99.93

The mineral is clearly not pitchblende, since the percentage of oxide of uranium is only about 12 per cent., whilst the principal constituent is oxide of thorium (thoria), which is present to the extent of more than 75 per cent., an amount far higher than that contained in any mineral hitherto examined. This mineral appears to be new, and I suggest for it the name of *thorianite*. Since it is radio-active, it will no doubt be found to be an important source of radium or radio-active earths, and will probably furnish helium, points which will be investigated as soon as more material has been obtained.

A second part of the same specimen furnished the following results on analysis:—

		Per cent.
Thorium oxide	... .. ThO <sub>2</sub>	72.24
Cerium oxide	... .. CeO <sub>2</sub>	6.39
Lanthanum and didymium oxide	... .. La <sub>2</sub> O <sub>3</sub> Di <sub>2</sub> O <sub>3</sub>	0.51
Zirconium oxide	... .. ZrO <sub>2</sub>	3.68
Uranium oxide	... .. UO <sub>3</sub>	11.19
Ferric oxide	... .. Fe <sub>2</sub> O <sub>3</sub>	1.92
Lead oxide	... .. PbO	2.25
Silica	... .. SiO <sub>2</sub>	1.34
Insoluble residue	... ..	0.41
		99.93
Specific gravity	... ..	8.98

The two sets of analytical data prove that the material has essentially a uniform composition, the differences observed being apparently due to inclusions of zircon in the second portion analysed.

In the meantime Sir William Crookes has received a specimen of the supposed pitchblende from Ceylon, and has found it to be radio-active to about the same extent as Cornish pitchblende.

Sir William Crookes was good enough to give me a part of his specimen, which is being analysed.

The second mineral examined was found by Mr. Holland in the same gem washings at Balangoda, and was identified as probably monazite. This mineral was pale brown, and when fractured exhibited a purple brown interior with a