

NOTE ON THE RESINOUS EARTH OCCURRING AT THE
HEAD OF THE NAMBUCCA RIVER, N. S. WALES.

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DURING the last few years instances have been recorded of the occurrence, in more than one locality in New South Wales, of an earthy substance which readily burns when a lighted match is applied to it. It has also been noticed that in the neighbourhood of this peculiar earth, water often shows iridescent films upon the surface. Peculiarities such as these are commonly thought to be due to the presence of oily substances, and naturally the idea has arisen that possibly petroleum oil may occur in close proximity to these readily ignitable earths. Natural liquid petroleum supplies would, of course, be of the greatest value to Australia, so that the question has considerable fascination for some people. If the material, the subject of this note, is representative of that found in the other localities in New South Wales, then the supposition that its presence is an indication of petroleum oil must be abandoned.

Investigation of the ignitable earth from the head of the Nambucca River shows it to be of organic origin; of this there seems to be little doubt for the following reasons:—

1. The ignitable substance is a resin.
2. The residue after removal of the resin by alcohol contains a fair amount of nitrogenous products, the nitrogen being evolved as ammonia on heating with soda-lime.
3. Phosphoric acid is present in some quantity in the ash.
4. Benzoic acid can be obtained in small amount from the material by sublimation.

The resin is not fossil, but, on the other hand, is apparently of somewhat recent formation, because the interiors of some of the lumps were quite soft when received, so much so that they could be drawn out in strings. On exposure this resin hardened considerably. The resin does not show resemblance to Coniferous resins, and about two-thirds consists of neutral bodies. Other New South Wales resin-yielding plant genera do not appear to offer a reasonable solution of the difficulty, so that it is necessary to seek further.

Earthy nodules are often found associated with the resinous earth in the locality mentioned; they are sometimes quite large and are coated with organic material, and have the general appearance of "Black-fellow's Bread," *Polyporus Mylittæ*. Is it that complete alteration of the organic material of these "Native truffles" under certain peculiar conditions, has brought about the formation of these resins?

Mr. Angus McKay, of Macksville, to whom I am indebted for the material, has supplied the following information concerning it. "The substance occurs at the head waters of the Nambucca River, at Taylor's Arm, and is first found at a depth of two feet under the ground, but has also been located at 30 feet. It occurs in layers of varying thickness up to 6 inches, and is found occasionally over an area of 15 to 20 miles by about 15 miles. It is principally found in what appears to have been an old river bed, in which a considerable quantity of black sand occurs."

The material submitted consisted of brittle and friable lumps, the largest roughly about two inches across. The larger masses are of a friable earthy nature, with bands of a more solid resin of an orange to lemon-yellow colour, the laminated nature of which often gives the appearance of a woody structure. The lumps readily ignited, melting easily

to a dark coloured mass, and continued to burn with a smoky flame and a resinous-like odour. The low melting point of the resin suggested perhaps the idea of a natural sealing wax. The resin is readily soluble in ether, alcohol, chloroform and acetone, and is partly soluble in petroleum ether.

The amount extracted by alcohol from average material of the most resinous lumps, containing 1·9 per cent. of moisture at 100° C., was equal to 65·2 per cent. Of the remainder 10·9 per cent. was removed on ignition, leaving 23·9 per cent. of ash. Of this amount 8·3 per cent. was removed on boiling with hydrochloric acid, which represents less than 2 per cent. on the whole material. The soluble portion of the ash contained phosphoric acid equal to 0·086 per cent., calculated on the whole. Iron, calcium, magnesium and potassium, besides a small quantity of sulphuric acid, were also present. The insoluble portion of the ash consisted mostly of silica, although no soluble silica was detected.

The alcoholic extract of the resin was dried on the water bath as much as possible, but as the melting point of the hardest purified resin is between 80° and 84° C., it was difficult to complete the drying in this way, so it was spread in thin layers upon glass plates and set aside to thoroughly dry in the air. The specific gravity of the resin thus prepared was 1·128 at 20° C.

A portion of the thoroughly dried resin was dissolved in ether and neutralised with alcoholic potash; only a small quantity, less than one per cent., of an insoluble potash salt was formed, this was filtered off, water added to filtrate, and the neutral resins extracted by ether in a separator. The aqueous portion was then evaporated down, acidified with hydrochloric acid and the resin acids separated. During the process a slight odour of benzoic acid was detected,

so a portion of the the resin acids was sublimed. A crystalline sublimate was obtained which from tests applied indicated benzoic acid. A larger portion of the original material was then sublimed through paper in a suitable apparatus, and sufficient acid thus obtained to enable it to be purified. It gave the tests for benzoic acid, and melted at 121° C.

A similar resinous earth from near Ourimbah, New South Wales, supplied by Mr. B. E. Broué, had all the properties of the above. It ignited readily and burnt with a smoky flame and a similar odour. The resin was readily extracted by alcohol, and when dry resembled in all respects the resin from the Nambucca River. It melted at the same temperature. The amount of material available did not permit of a complete examination.

In the Annual Report of the Department of Mines, N.S. Wales for 1890, page 308, Mr. J. C. H. Mingaye, F.I.C., reports on a substance from Bowra, in the Nambucca District, which was apparently of a somewhat similar nature.



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