XXXVIII.—CONTRIBUTIONS FROM THE LABORATORY OF
THE ROYAL COLLEGE OF CHEMISTRY, SCIENCE
SCHOOLS, SOUTH KENSINGTON.

On New Zealand Kauri Gum.

By EDWARD H. RENNIE, M.A. (Sydney), B.Sc. (Lond.).

THIS resin, which is the product of a coniferous tree (*Dammara Australis*) growing in New Zealand, seems to have been first examined in 1843 by R. D. Thomson (*Ann. Chim. Phys.* [3], 9, 499), who obtained from it by distillation at a gentle heat an amber-coloured oil containing 82.2 per cent. carbon and 11.1 per cent. hydrogen, to which he gave the name *dammarol*.

It was again examined in 1874 by M. M. P. Muir (this Journal, 1874, 733), who obtained from it, by dry distillation, an oil boiling between 155° and 156° which contained 79.07 per cent. carbon and 10.90 per cent. hydrogen, to which he ascribed provisionally the formula $C_{10}H_{20}O_7$, stating, however, that the quantity at his disposal was too small to make certain of the purity of his product. Having a considerable quantity of the Kauri gum at my disposal, I have thought it worth while to re-examine it, especially with regard to the volatile oil above mentioned.

The resin exhibited physical properties very similar to those described by previous observers. It was thought better, instead of subjecting it to dry distillation, to place it in a copper vessel which was heated by a gas flame, and through which a rapid current of steam was kept passing. The distillation was continued until a semi-solid sticky product began to form in the condenser. In this way 15 lbs. of the resin yielded about 750 c.c. of oil. The latter having been separated from the water was fractionally distilled. A very small quantity came over below 156°, the greater part coming over between this temperature and 160°. A small quantity came over between 160° and 180°, but above this latter temperature scarcely anything

more could be got to distil over, even in a vacuum; the residue when cold being a sticky gelatinous mass. On repeated fractionation, nearly the whole of the oil came over between 157° — 159° , very small quantities being obtained from 160° — 170° and 170° — 180° . The portion from 157° — 159° was distilled three times over sodium (which acted very slightly upon it), and was then found to boil almost constantly between 157° — 158° . This final product had a strong odour of turpentine, and was perfectly colourless.

On combustion it yielded the following numbers:—

I.	0.2358 gram substance gave	0.2545 H_2O .
		0.7600 CO_2 .
II.	0.1290 gram substance gave	0.1428 H_2O .
		0.4180 CO_2 .
III.	0.2160 gram substance gave	0.2322 H_2O .
		0.6954 CO_2 .
IV.	0.1970 gram substance gave	0.2126 H_2O .
		0.6344 CO_2 .

These correspond with the following percentages:—

	I.	II.	III.	IV.	Required for $\text{C}_{10}\text{H}_{16}$.
Carbon	87.91	88.37	87.80	87.82	88.23
Hydrogen	11.99	11.29	11.94	11.99	11.77

The liquid had a specific gravity of 0.863 at 18° , and in a column of 300 mm. in length acted very slightly on polarised light, giving a rotation to the left of three to four degrees.

By the action of phosphorus pentasulphide for 7—8 hours it was for the most part resinised, but a small quantity of liquid distilled over below 190° . This by repeated distillation over sodium, treatment with strong sulphuric acid, and fractionation, yielded a liquid boiling at 174° — 178° , which had the odour, external characteristics, and composition of cymene, and on oxidation with chromic liquor yielded terephthalic and acetic acids.

Attempts were made to isolate some other substances from the higher-boiling portions of the original oil, but on fractionation they all tended to a higher and lower limit, the latter being about 160° and the higher above 200° , and, as already stated, the portions above 200° seemed to polymerise and form only a sticky mass which would not distil even *in vacuo*.

From the above facts, it appears that the oil produced in the distillation of Kauri gum consists almost entirely of a terpene boiling at 157° — 158° , and closely resembling the other members of the same family in its physical and chemical characteristics; the higher boiling portions of the original oil being apparently formed by polymerisation.