chloroform). Colour reactions indicated it to be a saturated triterpene, $C_{30}H_{52}O_2$. That it is a diol was shown by the preparation of its diacetate, m.p. 276–79° and dibenzoate, m.p. 304–06°. It was identified as triterpene (Compound-A) earlier obtained by Agarwal et al.[3] from *L. isidiosa* by direct comparison.

(B) crystallised from dioxan-acetone as colourless long needles, m.p. 218–21°, $[a]_D - 59°$ (C, 1·0 in chloroform). It was non-phenolic and gave an orange red colour with a green fluorescence in the Liebermann-Burchard test. That it is an $a\beta$-unsaturated carboxylic acid was shown by its I.R. spectrum ($\nu_{max.}$ 1667 cm.$^{-1}$) and U.V. absorption ($\lambda_{max.}$ 239 mμ; log ϵ 3·92). It was identical with the "Compound-B" described by Agarwal et al.[3]

Ether extract of smaple 1 on evaporation gave a light violet mixture of thelephoric acid and a triterpene acid. Separation was effected taking advantage of the fact that thelephoric acid forms a blue-coloured water soluble complex with borax. The mixture was macerated with a concentrated solution of borax, the suspension filtered and the colourless residue washed with borax solution and water. The residue gave colour reactions of triterpenes and crystallised from glacial acetic acid as colourless needles, m.p. 289–91°. Its identity with the triterpene (D) obtained earlier from *L. isidiosa* was shown by mixed fusion and the identity of I.R. spectra ; their methyl esters were also found to be identical. The borax solution of the thelephoric acid on acidification deposited the acid as a

blue powder. Samples 2 and 4 also gave only compound-D from their ether extracts and no thelephoric acid whereas sample 3 did not give (D) and gave only stictic acid.

Acetone extract was studied in the same way as in the case of *L. isidiosa* and it gave thelephoric acid, stictic acid, D-arabitol and D-mannitol in all the four samples. Of the two sugar alcohols, only one could be isolated in each case while the presence of the other was detected by paper chromatography.

As will be clear from Tables I and II, there is general resemblance in the phenolic components of the various *Lobaria* samples examined but there are variations in the terpenoid components. Compound (A) is a diol, compound (B) an $a\beta$-unsaturated terpenoid acid and compound (D) is an unsaturated triterpene acid. It may be mentioned that the triterpene acid (Compound-C), m.p. 318-20°, reported by Agarwal et al.[3] from *L. isidiosa* has not been detected in the course of the present work. A detailed study of the compounds (A), (B) and (D) is in progress.

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RAMAN SPECTRUM OF GALLIUM PHOSPHIDE

RECENTLY considerable interest has been shown in the interpretation of the infra-red lattice absorption of crystals in terms of two-phonon interactions. A method of obtaining complementary information on the subject is to study the Raman scattering in typical crystals involving two-phonon processes. Results of such a study on the Raman spectra of gallium phosphide, using the 6328 A output of a helium-neon laser have been reported. This is the first time that a Raman spectrum has been measured for a III-V semiconductor. So far no Raman measurements have been made on III-V semiconductors because of the lack of suitable sources with photon energies less than the band gap of the semiconductor.

The sample was a zone-refined polycrystal of good optical quality. The laser beam of the He-Ne laser with a uniphase output of 30 mW c.w. was passed vertically through the gallium phosphide crystal, and the light scattered at right angles was examined with a $f/6$ Hilger and Watts Raman spectrograph.

In the Raman scattering process the first-order spectrum, which involves the creation or destruction of single phonons, is not so strong, does not obscure the two-phonon spectrum, and establishes the energies of the longitudinal (LO) and transverse (TO) optic branches at the centre of the zone. An analysis of the second-order Raman spectrum shows a number of lines which have been assigned to two-phonon interactions. Two prominent peaks at 782 cm.$^{-1}$ and 736 cm.$^{-1}$ correspond to the optical phonon energies of 391 cm.$^{-1}$ (TO) and 368 cm.$^{-1}$ (LO) at the zone centre.—[*Physics Letters* (Amsterdam), 1 November 1964.]