

ESSENTIAL OIL FROM THE GALLS OF *PISTACIA INTEGERREMA*

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The essential oil from the galls of *Pistacia integerrema* consists of 94% of α -*d*-pinene as the chief component.

The plant *Pistacia integerrema*, known in Sanskrit as 'Karkatasringi' and in vernacular as 'Kakra Singi' is indigenous to India and belongs to the Natural Order, Anacardiaceae. It is commonly met with in sub-alpine Himalayas. On the leaves and petioles of this plant are found peculiar gall-like excrescences which give the appearance of horns from a distance, and hence the name 'Kakra Singi' of the plant. The galls have been regarded as highly medicinal in the Unani as well as in Ayurvedic system of medicines and are specially used as useful remedy in cough, phthisis, asthma and other ailments connected with lungs, heart and chest.

Chopra and Ghosh (*Ind. J. Med. Res.*, 1929, 17, 377) reported the presence of an essential oil (about 1.2%), a crystalline hydrocarbon (3.4%), tannins (60%) and gum mastic (5%) in the drug. They, however, did not examine the constituents of the essential oil.

The main fraction consisting of 94% of the total oil distilled at 154°-155° at atmospheric pressure. Analysis of the fraction was found to correspond with the composition of a terpene $C_{10}H_{16}$. It formed a nitrosochloride (m.p. 103°-104°) and nitrol piperide (m.p. 118°) and showed specific rotation of 32.6°. From the boiling point of the fraction, its analysis, melting points of the nitrosyl chloride and nitrol piperide and the optical activity, the terpene was identified as α -*d*-pinene.

The constituents of the essential oils from the plants belonging to the N. O. of Anacardiaceae to which this plant belongs, invariably contain pinene as their chief component (cf. Parry, "Essential Oils", Vol. II, pp. 462, 463). Therefore, the discovery of pinene in the essential oil from *Pistacia integerrema* is in accordance with the feature characteristic of this family and it can be said in general that pinene is the chief component of the oils from plants belonging to this family. Read's view that botanical families can also be characterised by the chemical components of their essential oils is thus upheld.

EXPERIMENTAL

Isolation of the Essential Oil.—The essential oil was obtained by steam-distillation of the dried galls of the plant from a copper still fitted with a spiral copper condenser. The oil separated from the steam distillate as a light greenish yellow layer which was removed and dried over anhydrous calcium chloride. The oil was obtained in 1.8% yield. It possesses the properties: d_{20}^{20} , 0.837; n_D^{20} , 1.474; $[\alpha]_D^{25}$, 36°; acid value, 4.5.

Fractionation of the Oil.—The oil (50 c.c.) on fractionation under reduced pressure (30 mm.) gave the following fractions:

- (I) 60°-61°, 47 c.c.
- (II) 95°-98°, 1.5 c.c.
- (III) Residue, 1.5 c.c.

Identification of Pinene in Fraction (I).—Fraction (I) distilled at 154°-155° at atmospheric pressure and showed indifference towards reagents for alcohols, aldehydes, acids and ketones, etc. It remained unaffected with 10% solution of caustic soda and absorbed much bromine. (Found: C, 88.1; H, 11.8. $C_{10}H_{16}$ requires C, 88.2; 11.7 per cent).

Formation of Nitrosyl Chloride.—The fraction (I) (10 c.c.) was dissolved in glacial acetic acid (10 c.c.) and after cooling to 0°, amyl nitrite (20 c.c.) was added gradually, care being taken to keep the temperature low. After cooling the mixture thoroughly in ice and salt, hydrochloric acid (40 c.c., 2 parts acid and 1 part water) was added little by little. On standing a mass of light crystals separated, which were filtered off, dried and recrystallised from alcohol and ethyl acetate. The recrystallised nitrosyl chloride melted at 103.104°.

Formation of Nitrol piperide.—Nitrosochloride was dissolved in the least amount of alcohol and an alcoholic solution of piperidine was added to it and the mixture slightly warmed. The reaction product was poured in water when a solid white precipitate was obtained. It was filtered, dried and recrystallised from alcohol, m.p. 118°.

Fraction (II).—It distilled at 186°-189° at atmospheric pressure and absorbed bromine. It showed the reactions of an acid as well as an aldehyde. Thus it reduced ammoniacal silver nitrate and Fehling's solution, but did not form any semicarbazone. As the amount of the fraction was very small it could not be worked up further.