different localities, Delhi, Hardwar and Hyderabad were examined separately and gave the same results. The powdered bark was extracted with petroleum ether (60–80°), benzene, ether acetone and alcohol in succession. The petroleum ether extract on column chromatography over alumina gave a crystalline solid (120 mg per 360 g) m.p. 159°, $[\alpha]_D + 66$ (C 7·88 mg ml in $CHCl_3$), which gave a positive Liebermann-Burchard test and a positive Salkowski's test; tetranitromethane test was also positive. With acetic anhydride and pyridine in the cold it gave an acetate, m.p. 136–38°, it also formed a benzoate, m.p. 147°; UV spectrum of the compound was similar in shape to that of authentic ergosterol (*viz.*, 261, 272, 282, 294 mμ). However, absorption intensity of this compound was much lower than that of ergosterol. The acetate of the compound also showed a similar type of diene absorption (272, 283, 295 mμ). The Tortelli-Jaffe's test (Br_2 in chloroform) was negative. Due to paucity of the material and low yield of this compound detailed structural investigation could not be carried out.

The benzene and ether extracts of the root bark were very small in amounts and could not be studied. The acetone extract (10 g per 360 g) and alcohol extract (35 g per 360 g) were very similar in nature and were mixed, dried in the vacuum desiccator and extracted with absolute alcohol. The alcohol-insoluble part showed the presence of inorganic ions K^+, Na^+, Mg^{++}, Cl^- and NO_3^-. The alcohol-soluble portion gave a blue ferric reaction. Attempts to obtain a crystalline component by lead salt procedure followed by crystallisation and column chromatography were unsuccessful. Hydrolysis of alcoholic extract with 7% aqueous sulphuric acid yielded gallic acid and glucose which were not present in the extract before hydrolysis. Gallotannins therefore constituted considerable portions of the above extracts besides mineral matter.

The aqueous extract of the root bark showed the presence of Fe^{+++}, Al^{+++}, Mn^{++}, Ca^{++}, Mg^{++}, K^+, Na^+, CO_3^{--}, No_3^-, Cl^-, SO_4^{--} and PO_4^{---} ions. Ca^{++} and Mg^{++} were the major constituents.

Pluchea lanceolata (Rasna) is another plant with uses similar to those of *R communis*. The air-dried leaves of the plant were used. The petroleum ether extract on chromatography over alumina gave a crystalline solid (1 g/kg), m.p. 237–40°, which gave a positive Liebermann-Burchard test. Spectral data of the compound indicated the presence of acetoxyl and unsaturation. It could be hydrolysed by 20% aqueous sodium hydroxide solution to the hydroxy compound, m.p. 218°. Subsequent alcoholic extract on concentration deposited inorganic matter which was separated. Purification of the extract by precipitation as lead salt gave a yellow solid which was found to be a mixture of two compounds by TLC. The two compounds were separated by column chromatography over silica gel and were identified as quercetin and isorhamnetin by colour reactions, UV, and visible spectra with the usual shifts with reagents and preparation of their acetates and methyl ethers. The identity was confirmed by direct comparison with authentic samples of quercetin and isorhamnetin. The flavonoids were present as aglycones in a yield of 700 mg/kg and no glycosides were detected.

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ON THE SPIN OF THE 413 keV STATE IN Pm^{147}

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THE decay scheme of Nd^{147} to Pm^{147} is well studied.[1-5] The spins of the excited states are determined mainly from angular correlation studies. The characters of the ground and the 91 keV states are established to be $7/2^+$ and $5/2^+$ respectively. The spin assignment for the 413 keV state, however, is still uncertain, the values of 3/2, 5/2 or 7/2 being favoured by different workers.[4-8] A reinvestigation is therefore made employing a sum coincidence method which has several advantages over the conventional angular correlation techniques so far used.

The main features of the decay scheme $Nd^{147} \rightarrow Pm^{147}$ are shown in Fig. 1. The experimental arrangement employed is a conventional fast-slow sum-coincidence system with a 100 channel analyser and is described elsewhere.[9] The sum coincidence spectrum obtained with gate at 413 keV is shown in Fig. 2. It clearly

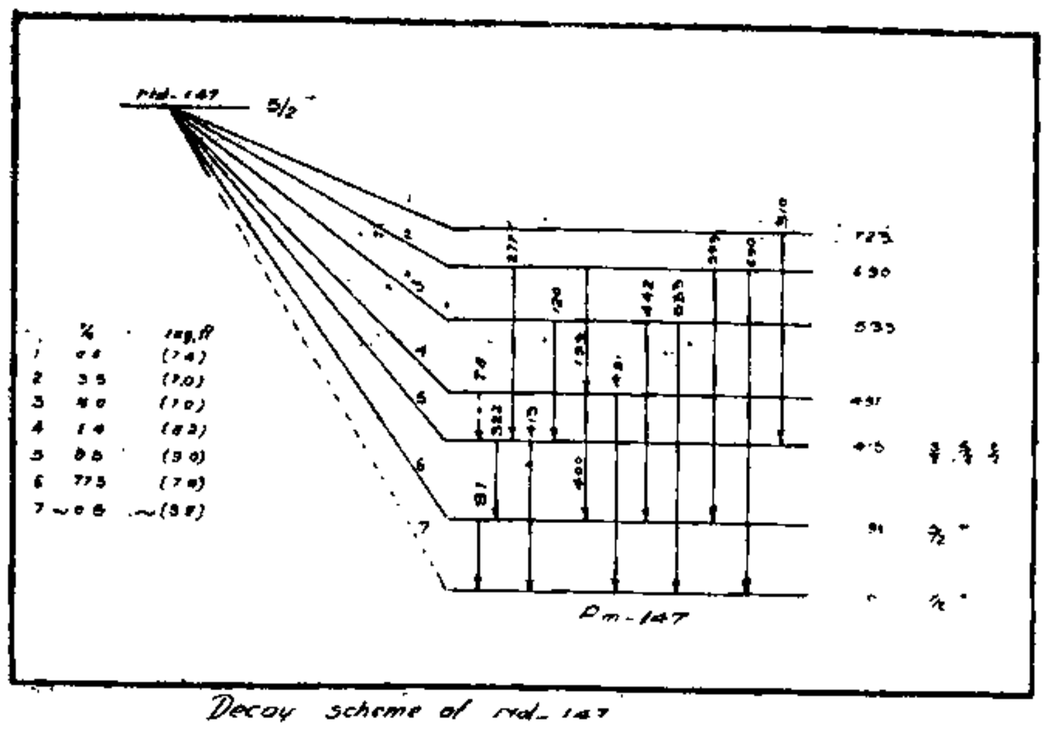

FIG. 1. Decay scheme of Nd-147.

shows peaks at 91 and 322 keV. The experiment is conducted by recording the sum coincidence spectra under same conditions for angles 180°, 135° and 90° between the detectors. At each angle a pooled total of 10,000 counts under the peaks are collected and they are fitted to a polynomial of the type

$$W(\theta) = 1 + A_2P_2(\cos\theta) + A_4P_4(\cos\theta)$$

after correcting the count rates for chance coincidences and wrong gate setting contributions employing White's method.[10] The correlation coefficients are corrected for finite detector sizes employing the experimentally determined values of attenuation coefficients in a manner described by Frankel.[11] The corrected values of the correlation coefficients are

$A_2 = -0{\cdot}075 \pm {\cdot}013$ and $A_4 = -0{\cdot}010 \pm 0{\cdot}013$.

Accepting the spins of the ground and the 91 keV states to be $7/2^+$ and $5/2^+$ and assuming the mixing ratios of the 91 and 322 keV transitions

(91 keV : 99·2% M1 + 0·8% E2 and
322 keV : 80% M1 + 20% E2)

from the data of Ewan *et al.*,[12] theoretical values of A_2 and A_4 are estimated for each spin assignment 3/2, 5/2 and 7/2 for the 413 keV state and for both signs of the mixing ratio (δ positive as well as negative). The resulting values of A_2 are given in Table I. The values of A_4 are vanishingly small in all cases.

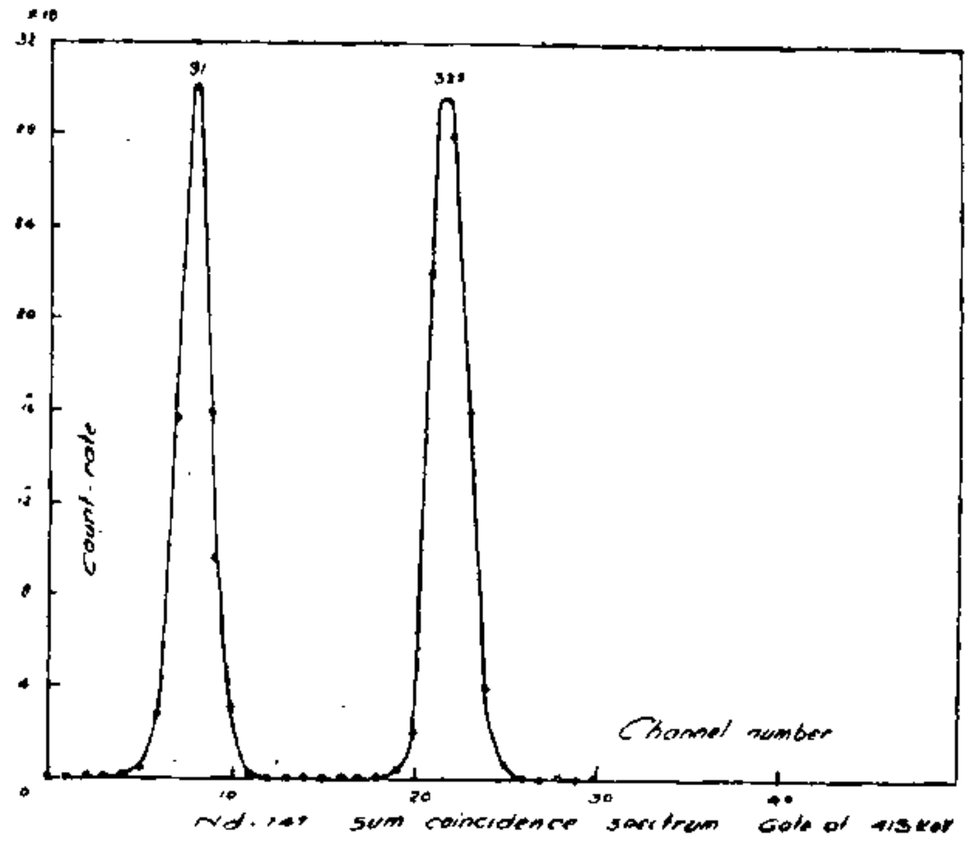

FIG. 2. Nd-147 sum coincidence spectrum. Gate at 413 keV.

An examination of Table I shows that none of the theoretical values shows any agreement both in magnitude and sign with the present experimental value. However, if due allowance is made for the errors in the mixing ratios, the value of A_2 obtained, assuming a spin of 3/2 for the 413 keV and like phases for both transitions (δ-positive), agrees with the present experimental value. The present experiment therefore favours an assignment of 3/2 for the spin of the 413 keV state in Pm^{147}.

TABLE I

Theoretical values of A_2 for the 322 → 91 keV gamma-gamma correlation

Spin sequence→		3/2→5/2→7/2	5/2→5/2→7/2	7/2→5/2→7/2
δ_1 Positive δ_2 ,,		−0·147	−0·209	+0·087
δ_1 Negative δ_2 ,,		−0·024	−0·002	+0·001
δ_1 Positive δ_2 Negative		+0·012	+0·017	−0·007
δ_1 ,, δ_2 Positive		+0·301	+0·029	−0·007

δ_1 and δ_2 refer to the mixing amplitudes in 322 keV and 91 keV gamma-rays.

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