Three of the lines are shown in Fig. 1, including the unclassified line $\lambda 6123.78$, the plate separation being chosen to show the widths of the multiplets before overlapping of orders occurs. The intervals between adjacent orders are marked, giving an indication of the separations. The closer components are completely separated for bigger gaps. The structure is not due to reversal, since it remains the same when viewing end-on through depths of vapour varying from 2 mm. to 50 cm.

The two members of the series $6^{1}S_{0} - m^{1}P_{1}$ have a sextet structure, thus indicating that both initial and final levels are multiple since the maximum number of possible components when one level is single, is three, assuming the usual selection principle to hold.



FIG. 1.—Fine structure in mercury spectrum. Fabry-Perot fringes, plate separation 9 mm.

As the final level is a ${}^{1}S_{0}$ level (j=0) it ought to remain single, if nuclear spin is the cause of the fine structure. However, the observed structure shows that it is at least double. It is possible that this multiplicity is due to an isotope effect. This is not the simple mass isotope effect (variation in Rydberg constant with mass) as recently observed in neon, for in mercury this would give maximum separations of approximately 0.00001 A., which is very much smaller than that observed. Schüller and Brück (Zeit. für Phys., 56, 291; 1929) conclude that in a mixture of isotopes, only those with odd atomic weight possess nuclear spin. Assuming this true in mercury, then two ${}^{1}S_{0}$ levels will result, with f value 0 + 0 = 0 for even atomic weights and 0 + i = i for odd. If i has more than one value, the level becomes still more complex. A detailed analysis of the observed fine structure will be published shortly. The intensity ratios of the components are also being investigated.

S. TOLANSKY. Physics Dept., Armstrong College (University of Durham), Newcastle-upon-Tyne, Aug. 11.

Spectra of Doubly and Trebly Ionised Thallium.

CONTINUING our previous work on Tl II and Pb III, the spectra of Tl III and Tl IV have been under examination by us for some time past. A preliminary attempt, by the application of the X-ray doublet-laws, revealed a number of regularities consisting of mainly the regular doublet terms. As a result of further attempts, it has now been possible to identify the inverted ²D term $(5d^{9}6s^{2})$ and the quartet terms of $(5d^96s6p)$ and $(5d^96s6d)$ configurations. The starting point for the discovery of the inverted 2D term was given by the identification of ν 76150, 81834, and 100452 as $6s'^2D - 7p^2P$. The super multiplet accompanying the electron transition $6p' \rightarrow 6d'$ contains about forty lines in the ultra-violet. A few combinations due to transitions $6p \rightarrow 7s$ have also been estab-The $(5d^96s^2)$ ²D term interval is found to be lished. The combinations that could not be identified 18618. are either very faint or out of range.

Thallium IV: The spectrum of trebly ionised thallium was recently studied by K. R. Rao, by Pattabhiramayya, and by J. E. Mack, who have all identified the triplets due to the combinations of $6s^3D$ and 1D with $6p^3PFD$ and 1FPD . As a result of attempts by one of us, it has been found possible to extend the analysis and identify the super multiplet due to the combination of $6p^3PFD$ with $7s^3D$ and 1D .

In both these spectra the line intensities, term differences, and interval ratios are of the right order expected. A complete report will be published shortly elsewhere. A. L. NARAYAN.

P. PATTABHI. A. S. RAO.

Kodaikanal Observatory, India, June 25.

Raman Spectra of the Mercaptans.

An investigation by me of the Raman effect in a series of mercaptans has yielded some noteworthy results. As is well known, the mercaptans are chemically analogous to the alcohols, the SH group in them replacing the OH group characteristic of the alcohols. The oscillation of the SH group comes out prominently as an intense though somewhat diffuse line in the Raman spectra of all the mercaptans examined, with a frequency shift of 2574 wave numbers. This is in marked contrast to the behaviour of the OH group, of which the broad band $(\nu = 3400 \text{ cm.}^{-1} \text{ approximately})$ appears only in water and methyl alcohol but not in the higher alcohols. Another strong line appears with all the mercaptans giving a frequency shift of about 657 wave numbers, and is evidently due to the oscillation of the CS group; it is in the same position as the most intense line in the spectrum of carbon disulphide. The analogous oscillation of the CO group with a frequency of about 1050 wave numbers appears strongly in methyl alcohol but only very weakly in the higher alcohols.

These differences in the behaviour of the SH and OH groups are sufficiently remarkable. Another notable feature is the unusual width and diffuseness of the lines ascribable to the oscillations of the carbon chain in the mercaptans. This character is presumably referable to the influence of the sulphur atom on these oscillations. S. VENKATESWARAN.

210 Bowbazar Street, Calcutta, July 12.

Hydrion Concentration of Rain and Potable Water.

For a study of the hydrion concentration of rain water New Milton appears to offer certain advantages. It is a small town equidistant between the Channel and the New Forest, about ten miles east of Bournemouth and seventeen miles south-west of Southampton, and it has the reputation of enjoying particularly pure and fresh air. For the past year and a half the hydrion concentration (pH) of the rain has been recorded together with the general direction of the wind, these observations having been made with the view to their possible value as part of the general problem of the influence of meteorological conditions upon plant diseases.

Indicators supplied by British Drug Houses, Ltd., were used to test the pH of rain collected from various plants and from two collectors about nine inches in diameter.

The pH of the water obtained from the collectors and from the plants varied between 5.5 and 7.6, with practically all intermediate values. The readings taken simultaneously from the collectors and from the