

weight. Two animals were used for each dose. It was found that, depending on the dose, the reduced glutathione content of the blood was reduced by 30–66 per cent. A second subsequent massive injection to the same animals on the next day resulted in lowering the reduced glutathione content still further.

Gregory and others<sup>3</sup> have found that the injection of anterior pituitary preparations lowers the glutathione content of tissues. Recently, Conn<sup>4</sup> has shown that there is a direct correlation between the production of a transitory diabetes in man produced by injecting a purified adrenocorticotrophic hormone, and the blood-glutathione level. Leech and Bailey<sup>5</sup> have investigated the effect of alloxan, and they found that the blood-glutathione content may fall to near zero values on alloxan injection. In view of these findings and the results reported here, it may be suggested that the lowering of reduced glutathione content of the blood is in some way responsible for the onset of diabetic troubles and *vice versa*; thus substances causing such reduction of reduced glutathione may increase susceptibility to the development of diabetes.

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<sup>1</sup> Nath, M. C., and Brahmachari, H. D., *Nature*, **154**, 487 (1944).

<sup>2</sup> Lazarow, A., *Physiol. Rev.*, **29**, 48 (1949).

<sup>3</sup> Goss, H., and Gregory, P. W., *Proc. Soc. Exp. Biol. and Med.*, **32**, 681 (1935). Gregory, P. W., and Goss, H., *Growth*, **3**, 159 (1939).

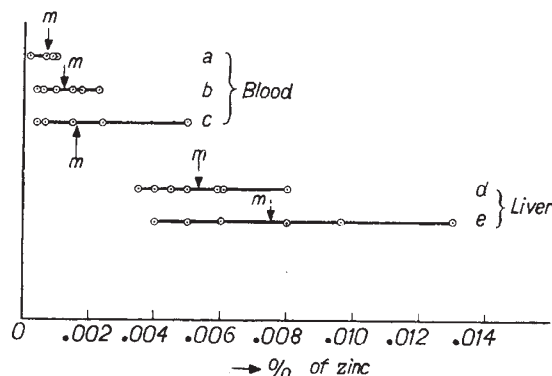
<sup>4</sup> Conn *et al.*, *J. Lab. and Clin. Med.*, **33**, 651 (1948).

<sup>5</sup> Leech, R. S., and Bailey, C. C., *J. Biol. Chem.*, **157**, 525 (1945).

### A Possible Correlation Between the Zinc Content of Liver and Blood and the Cancer Problem

In biochemical literature various metals are considered to be related to proteins present in the human body. These metals can be regarded as 'tracers' for these proteins. It was thought worth while to try to estimate these proteins by analysing ash of tissues and body liquids by means of the spectrograph for these metals. The direct-current carbon arc gives satisfactory results.

Among the elements iron, aluminium, calcium, sodium, potassium, magnesium, phosphorus, copper,



Ranges of zinc concentration found in blood and liver of: *a*, people with no disease (blood); *b*, patients with non-tumorous disease (blood); *c*, patients with malignant growth (blood); *d*, patients with non-tumorous disease (liver); *e*, patients with neoplasms (liver); *m*, mean values for zinc found.

zinc, lead, manganese, chromium, molybdenum, silver and silicon, determined during preliminary experiments, it was found that in the case of malignant growth the range of the zinc content was extended. Although differences of mean values found are not particularly significant (see table and graph), it seems of vital importance to investigate on one hand the behaviour of zinc-containing proteins in the human body, and on the other hand the relation between zinc and malignant growth.

Mean values and standard deviations of zinc concentrations found in various samples of blood and liver

Series	$n$ †	Mean per cent	Stand. dev.	Stand. dev. of mean	
Blood {	<i>a</i> (no disease)*	6	0.0007	0.00026	0.0001
	<i>b</i> (non-tumorous disease)	7	0.0012	0.00082	0.0002
	<i>c</i> (malignant growth)	7	0.0016	0.0015	0.0006
Liver {	<i>d</i> (non-tumorous disease)	7	0.0053	0.0014	0.0005
	<i>e</i> (patients with neoplasms)	6	0.0075	0.0030	0.0012

\* Cf. Vallee's value, found by using an improved dithizone method; mean: 0.00083 per cent; stand. dev. of mean: 0.00020 per cent (Vallee, B. L., and Gibson, J. G., *J. Biol. Chem.*, **176**, 445; 1948).  
†  $n$  = number of measurements.

Various samples of material have been obtained from Dr. P. Nieuwenhuys, professor of pathology in the University of Utrecht, who controlled all tissues, blood, etc., by histological and anatomical investigation.

Results will be published in full in *Rec. Trav. Chim. Pays-Bas*.

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### Dextrorotatory Acids of Tubercle Bacilli Lipids

WE wish to report that the dextrorotatory acids of the lipids of human tubercle bacilli, hitherto believed to be saturated acids, are  $\alpha\beta$ -unsaturated acids.

In a previous communication<sup>1</sup>, one of us has described the isolation of three dextrorotatory acids. This was effected by the fractional crystallization of semicarbazones and 2:4-dinitrophenylsemicarbazones of the acetol esters derived from the parent acids. Two of these acids ( $C_{28}$  and  $C_{30}$ ) were solids and one ( $C_{28}$ ) was a liquid. It has now been found that the solid acids are readily separable from other constituents of the mixture, owing to the sparing solubility of their potassium salts in cold ether. The analyses already given<sup>1</sup> included somewhat low figures for hydrogen (calculated for the saturated acids), and the theory for the new formulæ with two hydrogens less is in better agreement with the results.

The experimental evidence for the  $\alpha\beta$ -unsaturation of these acids may be summarized as follows:

The solid acids<sup>1</sup> ( $C_{28}H_{54}O_2$ ,  $[\alpha]_D^{20} + 11.7^\circ$  and  $C_{30}H_{58}O_2$ ,  $[\alpha]_D^{20} + 4.8^\circ$ ) (all rotatory powers were taken in ether; *c*, 10–15) exhibited in purified cyclohexane  $\lambda_{max}$  220  $\mu$  ( $\log \epsilon_{max}$  3.9) and  $\lambda_{max}$  219  $\mu$  ( $\log \epsilon_{max}$  3.9), respectively; the liquid acid<sup>1</sup> ( $[\alpha]_D^{20} + 11.1^\circ$ ) gave  $\lambda_{max}$  220  $\mu$  ( $\log \epsilon_{max}$  3.9).

A mixture of the solid acids (from the sparingly soluble potassium salts; found: C, 78.8; H, 12.5;  $C_{28}H_{54}O_2$  requires C, 79.6; H, 12.8 per cent.  $C_{30}H_{58}O_2$  requires C, 80.0; H, 12.9 per cent) exhibit-