Résumé

On a étudié sur le chien les courbes de l'activité cocarboxylasique du sang après injection de thiamine et des esthers mono di- et triphosphoriques de cette vitamine.

Antigenicity and Enzyme Activity of *Salmonella typhosa*

The relationship of antigenic make-up to the virulence of the typhoid bacilli has been the subject of extensive studies[1]. No attempt however appears to have been made to study the enzymatic activity of the various types of strains (Vi, O and H) in relation to their antigenicity and virulence. In the course of investigations along this line certain marked differences were observed in the oxidative metabolism of glutamic acid and tyrosine by the various strains possessing different antigenic characteristics. The present communication describes these results.

The following strains were used:

(1) BHATNAGAR's strain ViI[2] having predominantly the Vi antigen and no H antigen at all (O inagglutinable, low virulence).
(2) WATSON's V strain possessing all the three Vi, O, and H antigens (O inagglutinable, highly virulent).
(3) H 901 having H and O antigen (O agglutinable, low virulence).
(4) O 901 possessing O antigen only (highly sensitive to O-agglutinins and of low virulence).

All these cultures were maintained on the beef heart infusion agar medium, pH 7·6.

The metabolic studies were carried out by the conventional WARBURG's technique. 1 ml of M/15 phosphate buffer of pH 7·0 along with 1 ml of bacterial suspension was placed in the main compartment of the flask. In the centre cup was kept 0·2 ml of 10% KOH and a 2 cm² filter paper. 1·0 ml M/100 L-glutamic acid or L-tyrosine (B.D.H.) was taken in the side arm. The bacterial suspension was made from a 24 h growth at 37°C washed twice with 0·85% saline and finally adjusted to 40% transmission in a Lumetron photoelectric colorimeter Type 400 A using red filter (650 mμ). After equilibration (38·5°C), the substrate was tipped in the main compartment and the oxygen consumption was measured for a period of 2 h. The results at 60 and 120 min are presented in the Table.

Metabolism of glutamic acid and tyrosine by different antigenic strains of *S. typhosa*

Substrates	Time in minutes	Oxygen consumption (μl)			
		ViI	WATSON's V	H–901	O–901
L-Glutamic-acid . . .	60	141·2	89·8	73·7	65·3
	120	628·1	234·0	109·6	110·8
L-Tyrosine .	60	63·0	35·1	12·0	10·8
	120	269·5	67·3	18·0	18·0
Endogenous .	60	13·8	21·8	19·4	28·6
	120	23·4	30·0	25·2	34·9

[1] A. FELIX and R. M. PITT, Brit. J. Exptl. Path. *15*, 346 (1934); Lancet. *1*, 186 (1934); J. Hyg. *35*, 428 (1935).
[2] S. S. BHATNAGAR, C. G. J. SPEECHLY, and M. SINGH, J. Hyg. *38*, 663 (1938).

It is evident from this Table that the strains tested metabolised the two substrates in a markedly different manner. The maximum oxygen consumption in case of glutamic acid was shown by the strain most rich in Vi antigen (ViI) amounting to approximately six times that of the O-agglutinable strains (H–901, O–901) devoid of Vi antigen. The next in order was the WATSON's V, which gave only 30% respiration as compared to that of the ViI. On the other hand, H–901 and O–901 gave almost the same metabolism with respect to glutamic acid, the oxygen consumption in 2 h being approximately 110 μl.

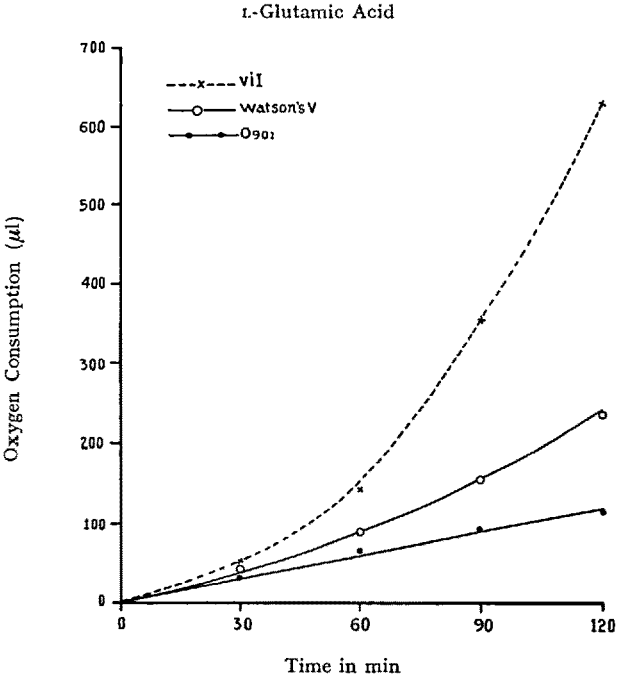

Fig. 1.—Metabolism of l-glutamic acid by different antigenic strains of *S. typhosa*.

The results with tyrosine (Table) follow essentially the same pattern, with the ViI strain showing approximately 42% of the corresponding activity for glutamic acid in 2 h. The differences between the various antigenic strains are well marked in this case also. Metabolic activity of the WATSON's strain and that of the other 2 strains corresponds to about 25 and 7% respectively of the ViI strain.

The time reaction curves for the ViI, WATSON's V and O–901 with glutamic acid are presented in Figure 1. All the three strains seem to show about the same metabolic activity up to first half an hour period after which the curve for ViI rises sharply. In the case of tyrosine also, the differences between the various strains are well marked as can be seen from Figure 2, where the oxygen consumption (μl) has been plotted against time of reaction.

It will be seen from the results presented that ViI strain has the maximum metabolic activity towards both glutamic acid and tyrosine, whereas WATSON's V strain, which antigenically occupies an intermediate position between the completely O-inagglutinable strain (ViI) and the O-agglutinable strains, metabolises these two substrates to a lesser degree. H–901 and O–901 strains show more or less the same activity. It would appear that 'Vi' antigen is in some way responsible for the differences observed in metabolism.

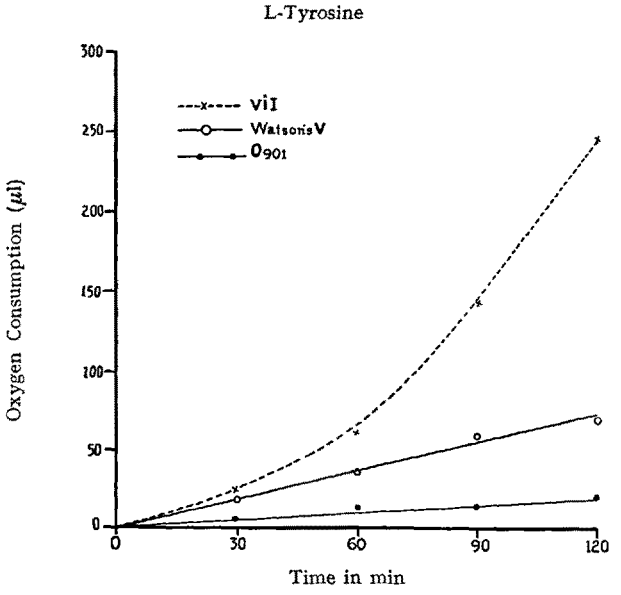

Fig. 2.—Metabolism of L-tyrosine by different antigenic strains of *S. typhosa*.

Further studies employing various substrates are in progress with a view to find a possible correlation between the enzyme make-up and the antigenic structure of strains of *S. typhosa* differently characterised.

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Zusammenfassung

Der Metabolismus von Glutaminsäure und Tyrosin verschiedener antigener Stämme von *Salmonella typhosa* wurde studiert. Der Stamm ViI gab den höchsten Sauerstoffwert gefolgt von WATSONS V, O-901 und H-901. Es wird angenommen, dass Vi für diese Unterschiede verantwortlich gemacht werden könnte.

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An Ultraviolet Microspectrophotometric Study of the Purkinje Cells of the Adult Albino Rat[1]

It has been shown by HYDÉN[2] and BRATTGÅRD and HYDÉN[3] that the chemical composition of the PURKINJE cells of the adult animal varies quantitatively with respect to nucleic acids and proteins, and it has been stated that such variation probably corresponds to differences in the functional conditions of these cells.

It remains to be established, however, how the cytochemical features of PURKINJE cells are related to the different stages of activity. With a view to a closer approach to this problem, a preliminary investigation of the PURKINJE cells of the adult albino rat has been performed, in order to evaluate the variability in the nucleic acids and protein content of these cells under physiological conditions. To such a purpose the methods for quantitative determinations, based upon the specific absorption in ultraviolet, which have been developed by CASPERSSON[1], have been employed: in particular the intense absorption of nucleic acids at 2650 Å and the main absorption band of the average protein substances at 2800 Å have been used. The present report describes the results obtained by the photoelectric microabsorption technique. A detailed discussion of the results will be published elsewhere.

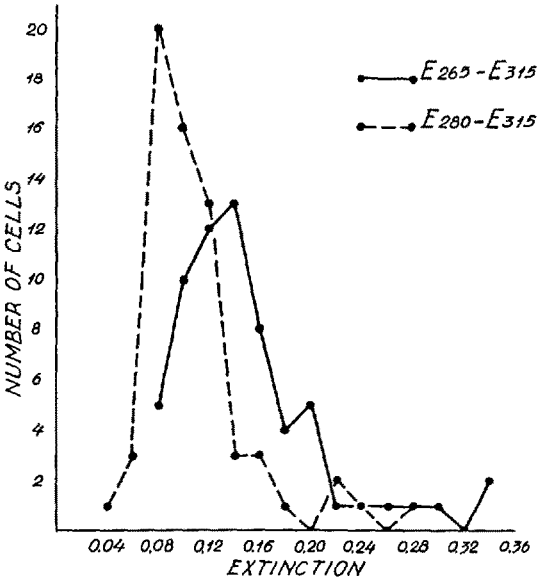

Fig. 1.—Frequency distribution of ultraviolet extinction values at 2650 Å and 2800 Å of PURKINJE cells, "corrected" by the subtraction of the extinction at 3150 Å: mean cytoplasmic values.

Material and methods. The anterior lobe of vermis cerebelli of an adult albino rat was treated in accordance with the freezing-drying method, embedded in paraffin and sliced in sections 5µ thick. The absorption measurements were carried out on the sections immersed in glycerine by the universal ultramicrospectrograph, which has recently been developed by CASPERSSON[2]. The diameter of the area in the object which was projected into the photomultiplier tube was about 0·77 µ. In order to obtain a mean extinction value for the cytoplasm of each cell it was considered sufficient to carry out the measurement by the scanning device, along a single cytoplasmic track. The cells selected for measurement were those which contained in the section the major part of the nucleus and which showed no signs of shrinkage. The transmission curves obtained with the microspectrograph were transformed into extinction curves by means of an automatic extinction calculator, while an integrator arrangement registered in the same time the surface under the extinction curve, that is the total extinction

[1] Preliminary note.
[2] H. HYDÉN, Acta Physiol. Scand. *6*, Suppl. 17 (1943).
[3] S. O. BRATTGÅRD and H. HYDÉN, Acta Radiolog. Suppl. *94* (1952).

[1] T. CASPERSSON, Skand. Arch. Physiol. *73*, Suppl. 8 (1936); J. Roy. Micr. Soc. *60*, 8 (1940); *Cell growth and cell function*. W. W. Norton Co., New York, 1950.
[2] T. CASPERSSON, Exp. Cell. Res. *1*, 595 (1950). – T. CASPERSSON, F. JACOBSSON, and G. LOMAKKA, Exp. Cell. Res. *2*, 301 (1951).