

the fermentation, constituting 1-2 per cent of a typical Robison ester, but is not present in the similar monophosphate fraction (Embden ester) prepared from muscle extract.

The mechanism of its formation affords an interesting problem in the enzymic synthesis of carbohydrate during the fermentation of hexoses. Meyerhof, Lohmann and Schuster have demonstrated the enzymic formation of ketosephosphates by the condensation of dihydroxyacetonephosphate with aldehydes in presence of aldolase⁵, and this reaction might account for the formation of a 1-phospho-ketoheptose. The enzymic transference of the phosphoric acid group to another position might then take place as in the case of the Cori ester, glucose-1-phosphate⁶.

R. ROBISON.

M. G. MACFARLANE.

A. TAZELAAR.

Lister Institute,
London.
June 16.

¹ Robison, *Biochem. J.*, **16**, 809 (1922).

² Robison and King, *Biochem. J.*, **25**, 323 (1931).

³ Robison, *Biochem. J.*, **26**, 2191 (1932).

⁴ La Forge, *J. Biol. Chem.*, **28**, 511 (1917).

⁵ Meyerhof, Lohmann and Schuster, *Biochem. Z.*, **236**, 301 (1936).

⁶ Cori and Cori, *Proc. Soc. Exp. Biol.*, **36**, 119 (1937).

The relation between the normal hæmoglobin and the extra capacity is indicated by the following observation. The superficial venous blood of the patient is found to be 20-25 per cent oxygenated by cutaneous oxygen absorption; if this blood is kept in a closed syringe for 30 min. at 37°, its hæmoglobin is at least 95 per cent reduced. Also, if one mixes equal parts of the patient's fully reduced arterial blood and of normal fully oxygenated blood (having the same hæmoglobin content) the resulting mixture after 2 min. is not 50 per cent but only 35 vol. per cent saturated. Again, if the patient's blood is 30 per cent oxygenated and then kept for 30 min. at 37°, it is nearly reduced, and now its oxygen capacity corresponds to the hæmoglobin content, the extra capacity being saturated now.

We have not been able to detect the biochemical mechanism of this extra capacity, but wish to direct attention to this probably not very rare occurrence of oxygen transport with the arterial blood in the completely reduced state.

R. BRINKMAN.

J. H. P. JONXIS.

Biochemical and
Pædiatric Laboratories,
Groningen.
June 7.

Oxygen Transport with Fully Reduced Arterial Hæmoglobin in the Human Being

It has been long known that infants, born with a transposition of the pulmonary artery and the aorta, may be living with a very cyanotic appearance. In two cases which lately came under our observation, not a trace of oxygenated hæmoglobin was found in the arterial blood with methods certainly sensitive to one per cent of oxygen saturation, although no further marked symptoms of oxygen want were present. The oxygen consumption of the two patients was not far from normal and, though we are not able to give a complete explanation of the curious conditions, we have found some interesting properties in the blood of one patient we had an opportunity of studying somewhat closely at the age of four months.

The hæmoglobin, as judged by its spreading properties at various hydrogen ion concentrations, its oxygen dissociation curve, its alkaline resistance, its vital decomposition and formation (icterus neonatorum) was normal; the concentration varied between 17 and 20 per cent. There was slight acidosis; the pH of the blood was in the normal range.

Whereas the oxygen capacity was calculated from the hæmoglobin percentage to be 27 vol. per cent, the Barcroft manometric technique gave an absorption of 38 vol. per cent of oxygen by the arterial blood. Saturation of this blood by carbon monoxide decreased the uptake of oxygen by the expected 27 vol. per cent, leaving an extra absorption of 9 vol. per cent. The same treatment of samples of normal blood always reduced the oxygen absorption to zero.

So the patient's blood appeared to have, besides its normal oxygen capacity, depending on the presence of reduced hæmoglobin, an extra capacity of 9 vol. per cent; the rate of absorption by this extra capacity was about one fourth of that by the normal capacity at room temperature. The extra capacity was not found in the plasma, but only if corpuscles were present; it was not much influenced by small amounts of cyanide or iodoacetate.

Sugar Content of the Hormones of the Pituitary Anterior Lobe and of the Gonadotropic Hormone from Pregnancy Urine

DURING our investigation of the active principles of the pituitary anterior lobe and of the gonadotropic hormone from pregnancy urine, we established the fact that the gonad-stimulating factors of the anterior lobe and, more particularly, prolan from pregnancy urine, contain considerable quantities of carbohydrate, even when in a highly purified state. This carbohydrate could not be removed, nor its percentage decreased, by treatment with weak alkalis or by prolonged and repeated dialysis. Such properties seem to indicate the presence of glycoproteins in the gonadotropic protein factors. The sugar may be combined with the protein in the form of a polysaccharide. The nature and quantity of the basic carbohydrate was determined by means of the orcin-sulphuric acid reaction. The gonadotropic factors of the pituitary anterior lobe contain 6 per cent (maximum value) of mannose; prolan obtained from pregnancy urine contains 19 per cent (maximum value) of mannose; or possibly of galactose, or of both these hexoses (the preparations have not yet been tested for hexosamine).

The existence of mannose (or galactose) in the gonadotropic substances is not surprising. Sørensen and Haugaard discovered that the sugar-protein complexes generally contained mannose or galactose (or both) and not glucose as previously thought. On the other hand, the large percentage of carbohydrate, in comparison with the other sacchariferous proteins, is very noteworthy. It is possible that the physiological activity of the gonadotropic factors is due to, or connected with, the presence of such glycoproteins. The rather remarkable observation was made that, on isolating the gonadotropically active portions of the pituitary anterior lobe, and of pregnancy urine, the sugar content increased. The difficultly soluble portion of the anterior pituitary extract shows no, or only a weak, sugar reaction, the prolactin fraction being practically free from sugar.