

Table 1. RELATIONSHIP BETWEEN OBSERVED FLOUR DIASTATIC ACTIVITY AND FLOUR DIASTATIC ACTIVITY PREDICTED FROM A KNOWLEDGE OF GRAIN CONSISTENCY, AS MEASURED BY PARTICLE SIZE INDEX SYSTEM

Variety	Particle size index	Observed diastatic activity (mg maltose/10 g flour)	Predicted diastatic activity (mg maltose/10 g flour)
Dural ( <i>T. durum</i> )	5.1	526	534
KFBF × P <sub>4</sub> × Baringa ( <i>T. vulgare</i> )	6.1	440	450
Baringa	8.0	348	344
Curlew	10.1	276	272
Falcon	11.3	244	244
Festival	12.1	228	226
M993 (Bungulla × Gabo)	13.0	233	211
Gabo	13.1	214	209
Spica	16.6	175	175
Javelin 48	25.4	104	108
Bordan	26.3	101	104
Heron	28.5	89	96
Olympic	30.0	88	91
Quadrat	31.0	81	88
Sherpa	32.2	88	85
Sherpa	38.5	71	71

for 10 min on a 200-mesh wire sieve, the percentage of throughs being recorded as the particle size index. *Durum* wheats have an index of 5, while a figure of 40 has been recorded for certain soft biscuit-type varieties.

A close logarithmic relationship was found to exist between flour diastatic activity and grain consistency as measured by the particle size index system (Fig. 1). By means of this relationship it was possible to predict the flour diastatic activity with some degree of accuracy from a knowledge of the particle size index of the grain (Table 1). From the range of varieties which were classified in this way, 12 varieties, chosen to cover the full range of diastatic activity encountered, were grown for 2 seasons in a series of 10 replicated trials throughout the Australian wheat-belt, in order to test the effect of environmental fluctuations on the classification. Preliminary results from these trials have indicated that the logarithmic relationship referred to here is maintained under a variety of edaphic and climatic conditions.

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<sup>1</sup> Blish, M. J., and Sandstedt, R. M., *Cereal Chem.*, **10**, 189 (1933).<sup>2</sup> Symes, K. J., *Austral. J. Exp. Agric. and Anim. Husb.*, **1**, 18 (1961).

### Effect of Vitamin B<sub>6</sub> and its Analogues on the Swelling of Rat Liver Mitochondria

It has been observed<sup>1,2</sup> that substances like thyroxine, Ca<sup>++</sup>, orthophosphate, induce swelling in rat liver mitochondria when suspended in a medium containing 0.3 M sucrose, and 0.02 M *tris*(hydroxymethyl)aminomethane, at pH 7.4. That the swelling of mitochondria is dependent on the respiratory chain is shown by the fact that 2,4-dinitrophenol, which is an uncoupler of oxidative phosphorylation, is a strong inhibitor of mitochondrial swelling<sup>1</sup>. The swelling of mitochondria is associated with the active water uptake, which was first pointed out by Raaflaub<sup>3</sup>. The active water uptake is also inhibited by adenine triphosphate<sup>4</sup>. Other substances like spermine, spermidine, and related polyamine also inhibit swelling<sup>5</sup>. It has also been observed that many antihistamine drugs inhibit mitochondrial swelling<sup>6</sup> where permeability change has been suggested. It is known that pyridoxal phosphate intensifies the uptake of amino-acids by Ehrlich ascites tumour cells<sup>7</sup> with the concomitant uptake of water. A study of the effect of pyridoxal phosphate and other analogues of vitamin B<sub>6</sub> on the active water uptake by rat liver mitochondria will be of some interest.

In the present investigation the rat liver mitochondria was isolated by usual methods, and swelling was studied in a medium containing 0.3 M sucrose and 0.02 M *tris*(hydroxymethyl)aminomethane at pH 7.4 by observing the optical density at 520 mμ according to the method<sup>8</sup>

Table 1. SWELLING OF RAT LIVER MITOCHONDRIA *in vitro* IN PRESENCE OF VITAMIN B<sub>6</sub> ANALOGUES. THE SWELLING OF MITOCHONDRIA IN 0.3 M SUCROSE 0.02 M *tris* MEDIUM AT 15 MIN IS TAKEN AS 100

Compound	Concentration	Relative swelling
Pyridoxal	1 mM	103
Pyridoxine	1 mM	98
Pyridoxamine	2 mM	100
PMP*	1 mM	92
PLP†	1 mM	80
PLP†	2 mM	68
DP‡	1 mM	53
DP‡	2 mM	25
DP + Pyridoxine	1 mM + 1 mM	80
DP + Pyridoxal	1 mM + 1 mM	88
DP + Pyridoxamine	1 mM + 1 mM	56
DP + PMP	1 mM + 1 mM	80
DP + PLP	1 mM + 1 mM	0

\* Pyridoxamine phosphate. † Pyridoxal phosphate; ‡ 4-Deoxy-pyridoxine.

published previously. The results are shown in Table 1. Of all the various analogues of vitamin B<sub>6</sub> tested, pyridoxal phosphate and 4-deoxy-pyridoxine inhibit the swelling to the extent of 32 per cent and 75 per cent respectively when present in 2 mM-levels. The rest of the compounds are inactive. When 4-deoxy-pyridoxine and pyridoxal phosphate are present together at 1 mM-level, they prevent swelling completely. These two compounds together cannot prevent the swelling of rat liver mitochondria caused by thyroxine. When other analogues of vitamin B<sub>6</sub> are present along with 4-deoxy-pyridoxine they do not show any synergistic effect. The inhibition of mitochondrial swelling by 4-deoxy-pyridoxine has similarity to the action of 2,4-dinitrophenol in that it releases the adenosine triphosphatase activity of the mitochondria to about four-fold that of the blank when present in equimolecular level, but on the contrary when 4-deoxy-pyridoxine and pyridoxal phosphate are present together it is inactive in releasing the adenosine triphosphatase activity *in vitro* of the mitochondria. The other compounds are inactive in releasing the adenosine triphosphatase from rat liver mitochondria.

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## PHYSIOLOGY

### Relationship between Venous Pressure and Cortical Blood Flow

IN man, acute occlusion of the superior vena cava results in complete obstruction to cerebral venous drainage, with gross changes in the electroencephalogram. In the dog, however, complete constriction of the superior vena cava results in a rise in cerebral venous pressure, but no significant changes in the EEG<sup>1</sup> (Fig. 1). Venous pressure is compounded of a number of variables<sup>2</sup> and a number of pressure-flow relations have been demonstrated in distensible vascular beds<sup>3</sup>.

A veni-vasomotor reflex has been postulated for the finger<sup>4</sup>. A fall in flow was observed following distension of the venous bed. A similar mechanism may result in cerebral ischaemia following increases in intracranial venous pressure with coughing and straining. It is, however, more probable that an alternative mechanism is present tending to stabilize cerebral blood flow despite fluctuations in venous pressure. This communication supports this possibility.