

(1) Guinea pigs vaccinated with such bacteria and tested with 1/50 mgm. of virulent B.K. show a survival (250 ± 40 days) double that of controls (133 ± 30 days), the difference being statistically significant.

(2) A regular decrease of temperature and an improvement of the lesions have been observed in most of the cases of tuberculosis, bony, ganglionic, kidney and pulmonary, under treatment (60 cases). The complete harmlessness of the vaccine has been established even in very serious cases; the radio-vaccine never caused recrudescence.

Thus the action of ionizing radiations enables us to obtain living human tubercle bacillus which are non-virulent; this would seem to be of particular interest to immunologists.

Laboratoire Curie,
Institut du Radium,
11 Rue Pierre-Curie,
Paris, 5^e.
Sept. 15.

P. BONET-MAURY.
H. R. OLIVIER.

Necessity of Magnesium in the Pyruvate Oxidation System of Brain*

THE necessity of Mg^{++} in enzymic reactions involving transfer of phosphate groups through the adenylic acid system is well known. More recently, Mn^{++} has also been shown to be active in reactions of this type¹. Further, Auhagen² and later Lohmann and Schuster³ showed that the decarboxylation of pyruvic acid by yeast requires Mg^{++} (or Mn^{++}). This made it likely that these ions are also necessary for the oxidative breakdown of pyruvic acid in animal tissues, the more so as this breakdown is related with reactions involving the adenylic acid system⁴.

Stimulation by Mg^{++} of the oxidative decarboxylation of pyruvate by washed muscle preparations was reported by Annau and Erdös⁵. Addition of Mg^{++} has little or no effect on the oxidation of pyruvate by dispersions from pigeon brain⁴ after short dialysis periods (2-3 hours), but the effect is more marked if the dialysis is extended for periods of 8 hours. A clearer demonstration has, however, been obtained by adding to the enzyme an excess of sodium pyrophosphate (0.0067 *M*.) to precipitate magnesium. Pyrophosphate is then removed to the extent of 90 per cent by 8 hours dialysis, when its concentration is of the order of 0.0007 *M*. and is, by itself, without effect on the respiration of the brain preparations. The preparations which have, however, been treated as described above give with pyruvate nearly one third of the oxygen uptake which can be obtained by adding Mg^{++} . These facts are illustrated in the table below. Samples contained 1.5 ml. enzyme (dialysed 8 hours), brought to a volume of 2 ml. with additions including phosphate buffer pH 7.3 (0.05 *M*.), fumarate (0.005 *M*.), adenylic acid (0.0007 *M*.), and cytochrome (0.00007 *M*.).

Treatment	Pyruvate	Mg^{++} (as $MgCl_2$)	Mn^{++} (as $MnCl_2$)	μ l. oxygen uptake in 30 min. (air, 33°)
No pyrophosphate	—	—	—	2
	2 mem.	100 γ	—	61
	2 "	100 γ	—	432
Pyrophosphate treated	2 "	—	—	175
	2 "	100 γ	—	400
	2 "	150 γ	—	455
	2 "	—	100 γ	345

* These results are presented here owing to the temporary discontinuance of the meetings of the Biochemical Society.

Mg^{++} (or Mn^{++}) is therefore a component of the pyruvate oxidation system.

I am indebted to the Nuffield trustees for grants in aid of this work.

Department of Biochemistry,
Oxford. Sept. 30.

S. OCHOA.

¹ Ohlmeyer and Ochoa, *Biochem. Z.*, **293**, 338 (1937).

² *Z. physiol. Chem.*, **209**, 20 (1932).

³ *Biochem. Z.*, **294**, 188 (1937).

⁴ Banga, Ochoa and Peters, *NATURE*, **144**, 74 (1939).

⁵ *Z. physiol. Chem.*, **257**, 111 (1939).

Sex Difference in the Response of the Pigeon Crop-Gland to Prolactin

It has generally been thought¹ that there is no detectable sex difference in the response of the pigeon crop-gland to prolactin. Folley and White², however, were able to demonstrate a significantly greater response in males than in females, a finding which has since been confirmed by Bates and Riddle³ for subcutaneous but not for intramuscular injections.

Preliminary examination of more extensive results which have accumulated in this laboratory in the course of further experiments on the inhibition by oestrogens of the prolactin response⁴ appeared at first sight to indicate no sex difference in response. Since, however, re-examination of the original records of Folley and White revealed that their groups consisted almost entirely of immature birds, a further analysis of the above-mentioned data, in which the birds were classified as mature and immature on the basis of gonad size at autopsy, was undertaken. Details of the experimental technique are given elsewhere⁴, the birds referred to below comprising the prolactin and oil-injected controls together with a group of birds used for constructing a dose-response curve.

The following results relate to two groups of birds receiving the same daily dose of prolactin but different doses of sesame oil (these were also combined to make a third group on the reasonable assumption that the sesame oil injections had no effect on the prolactin response) and a fourth group receiving a lower dose of prolactin. For groups of 'mature' birds the mean male crop weights exceeded those of females by 0.11, 0.06, 0.08 and 0.17 gm. per 100 gm. body weight respectively, the corresponding values of *P* (Fisher's 't' test⁵) being 0.3-0.4, 0.5-0.6, 0.3 and 0.2-0.3. For 'immature' birds the mean crop weights of males were 0.30, 0.31, 0.36 and 0.11 gm. per 100 gm. body weight greater than those of females. Here the values of *P* were 0.14, 0.076, 0.01-0.02 and 0.1-0.2.

It will be seen that for 'mature' birds the differences between the male and female crop weights were small and apparently not significant. On the other hand, in 'immature' birds receiving the higher dose of prolactin the differences were much larger and the significance levels much higher. It therefore appears that this sex difference in response to prolactin is most marked in pigeons with undeveloped gonads.

S. J. FOLLEY.

National Institute for Research in Dairying,
Shinfield, Reading.

Oct. 1.

¹ Rowlands, I. W., *Quart. J. Pharm. and Pharmacol.*, **10**, 216 (1937).

² Folley, S. J., and White, P., *NATURE*, **140**, 505 (1937).

³ Bates, R. W., and Riddle, O., *J. Biol. Chem.*, **123**; *Proc. Amer. Soc. Biol. Chemists*, **5** (1939).

⁴ Folley, S. J., *Endocrinology*, **24**, 814 (1939).

⁵ Fisher, R. A., "Statistical Methods for Research Workers" (Edinburgh: Oliver and Boyd, 1934).