Although these findings indicate that the plant possibly exerts at least a part of its 'rhizosphere effect', through ability to excrete thiamin and biotin, more direct evidence to support this tentative assumption was desired. Seeds of Novelty and Bison flax were sterilized, and germinated in petri plates. After four days at 28° C. the seed-coats were carefully removed from the cotyledons and the seedlings planted in 8-in. test tubes containing 15 ml. sterile nutrient solution. A circular disk of cheese-cloth supported by short lengths of glass tubing held the plant at the surface. Following one, two and three weeks of growth, the nutrient solutions from five tubes, containing one plant per tube, after being checked for sterility, were combined and concentrated in volume to 10 ml.

The plant excretions were assayed for thiamin by the growth response of *Staphylococcus aureus* in a medium containing all essentials except the substance to be determined[1]. The presence of thiamin was readily detectable by this method; the excretion from five Bison flax seedlings was 0·23 and 0·64 gammas, and from five Novelty flax 0·24 and 0·64 gammas after one and two weeks of growth respectively. The appearance of inhibitory material in the plant excretions after two weeks interfered with this assay on older seedlings.

Biotin was assayed by the response of *Rhizobium trifolii* (Wisconsin Strain 205) according to the technique described by West and Wilson[2]. The amounts of this factor excreted in one, two and three weeks were in the neighbourhood of 0·06, 0·25 and 0·21 gammas, and 0·08, 0·20 and 0·20 gammas for five Bison and Novelty flax seedlings respectively. While it is recognized that the accuracy of these results depends on the validity of the assay methods concerned, it is believed that the specificity of these microbiological tests has been satisfactorily established for the strains employed[2,4,5,6,7].

From these observations it appears that the excretion of significant amounts of thiamin and biotin from young roots of higher plants occurs normally, even under sterile conditions, and accounts, at least in part, for certain quantitative and qualitative differences characteristic of the bacterial flora of the rhizosphere.

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[1] Kögl, F., and Tonnis, B., *Z. physiol. Chem.*, **242**, 43 (1936).
[2] West, P. M., and Wilson, P. W., *Enzymologia*. In the press.
[3] West, P. M., and Lochhead, A. G., *Can. J. Res.* In the press.
[4] West, P. M., and Wilson, P. W., *Science*, **83**, 334 (1938).
[5] Knight, B. C. J. G., *Brit. J. Exp. Path.*, **16**, 315 (1935).
[6] Knight, B. C. J. G., *Biochem. J.*, **31**, 731 (1937).
[7] Nilsson, R., Bjälfve, G., and Burström, D., *Ann. landw. hochschule Schwedens*, **7**, 301 (1939).

Points from Foregoing Letters

L. Wertenstein was investigating the radioactive gases evolved in the fission of uranium at the Miroslaw Kernbaum Radiological Laboratory of the Warsaw Society of Sciences when Poland was invaded. Writing from Turczynek, near Warsaw, he describes some of the results he had obtained. The radioactive gases were carried through two Geiger-Müller counters placed in series and the time lag of arrival of the gases in the counters could be varied by a system of capillary tubes. Typical curves indicate bodies of period of the order of a minute, and others of much longer period, giving almost constant residual activity within the time of experiment.

J. Read points out that if Baade and Zwicky's theory of cosmic radiation is true, the experimental evidence regarding the helium content of beryls is not incompatible with the assumption that this helium was produced by cosmic rays. The possibility of biological effects due to cosmic rays would also need reconsideration.

M. H. A. Newman questions Prof. H. Dingle's view that the current doctrine of the slowing down of moving clocks in relativity is incorrect. Prof. Dingle, in reply maintains that the clocks described by him are legitimate, and that the uncorrected dial readings referred to by Mr. Newman are not relevant to the problem.

F. Majewsky and W. A. Roach have rendered Ramage's flame method of spectrochemical analysis more sensitive and the results more reproducible. The roll containing the sample is introduced into ammonium chloride vapour to drive off volatile gases and convert the minerals into their chlorides before the roll is burnt in the oxy-coal-gas flame.

J. C. McKerrow suggests that some anthropoid became man as behaviour became more and more conditioned by custom. Confirmation of this hypothesis, itself based on the view of Nature which he has propounded in "Novius Organum", is found in the facts of taboo and totemism.

Since adenoma-like changes and the most severe degree of metaplasia appear in the uterus of rats only when male hormones are administered in addition to œstrogens, V. Korenchevsky and K. Hall conclude that disturbance of the ratio of the male and female sex hormones may be an important factor in the occurrence and development of some types of tumours.

Heavy mortality of *Mactra corallina cinerea* (Montagu) on the Lancashire coast is reported by G. E. Williams. Comparisons are made with two previously recorded mollusc mortalities on this part of the coast.

R. N. Salaman and W. R. S. Wortley have shown that the cultivated Brassicæ, as well as the garden pea, red clover and common bindweed, may be induced to behave as symptomless hosts of two destructive viruses which affect the potato crop. It is suggested that certain of these plants may serve as virus reservoirs as well as overwintering hosts for the aphid vector.

G. Metcalfe describes a disease of Forsythia, apparently caused by *Ps. syringæ*.

The excretion of thiamin and biotin from young roots of higher plants has been found by P. M. West to be of significance in explaining the occurrence of high numbers of bacteria requiring those growth substances, in the soil adjacent to the root surface.