Table 1. Effect of Cations on the Rate of Penetration of Glutamate into the Cells of *E. coli* and *P. tularensis*

Time	Counts/10 min.*									
	No electrolyte added		KCl		NaCl		LiCl		RbCl	
	E.	*P.*	*E.*	*P.*	*E.*	*P.*	*E.*	*P.*	*E.*	*P.*
30 sec.	40	36	240	210	50	80	50	80	70	150
3 min.	60	60	530	566	50	170	50	170	110	310
6 min.	70	80	500	560	140	260	130	260	160	410

* After the deduction of the background count (200/10 min.). 100 counts/10 min. represent approximately 3×10^{-3} μmole of glutamate.

After thermal equilibration (28° C.) 0·03 *M tris* glutamate and glutamate uniformly labelled with carbon-14 (0·01 μc./ml.) were added, samples of 3·0 ml. were withdrawn at various time-intervals, chilled to 0° C. and centrifuged (30,000*g*). The radioactivity of the well-drained but unwashed cell mass was determined by a method essentially identical with the procedure adopted by Krebs *et al.*[1].

Results which show the effect of various monovalent cations (tested as their chlorides) on the rate of increase of the radioactivity in the bacterial cell mass (*E. coli*; *P. tularensis*) are given in Table 1. The modifying influence of the anions on this process is shown in Table 2. It can be seen that potassium chloride in *E. coli* and potassium chloride and rubidium chloride in *P. tularensis* which accelerate the oxidation of glutamate also increased the rate of its accumulation. Cations which were found ineffective on the respiration also had no effect on the accumulation. A mixture of potassium and sodium nitrates was as effective as potassium chloride, while each compound separately accelerated neither accumulation nor the oxidation of the substrate. The nature of the anion affected respiration and accumulation in a parallel manner.

Table 2. Effect of Anions on the Rate of Penetration of Glutamate into the Cells of *E. coli* and *P. tularensis*

Time	Counts/10 min.*											
	No electrolyte added		KCl		KBr		KNO_3		K_2SO_4		KNO_2 + $NaNO_3$	
	E.	*P.*	*E.*	*P.*	*E.*	*P.*	*E.*	*P.*	*E.*	*P.*	*E.*	*P.*
30 sec.	40	70	190	200	110	250	80	68	190	60	180	—
3 min	70	100	480	540	120	542	150	260	410	270	410	—
6 min.	90	90	560	560	130	613	180	260	440	270	595	—

* After the deduction of the background count (200/10 min.). 100 counts/10 min. represent approximately 3×10^{-3} μmole of glutamate.

In view of similarity of effect of the ionic environment on the respiration and on the 'uptake' of the substrate, consideration has to be given to the possibility that the electrolytes regulate the rate of respiration by controlling a process directly connected with the penetration of the substrate.

It remains, however, to be shown that increase in radioactivity in the cell mass is due to the penetration of the substrate into the bacteria, and furthermore, that penetration is the rate-limiting factor in the reaction sequence.

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Novel Action of Potassium on a Yeast and a Counteraction by Aluminium

A paper[1] from this laboratory described an improved method for the estimation of *Oospora lactis* Fres. (formerly known as *Oidium lactis*) in pressed bakers' yeast, using a medium consisting of ammonium succinate, mineral salts and agar. The method worked well with most yeasts, but one strain (*Saccharomyces cerevisiae* D.C.L. 557) prevented the growth of visible colonies of *Oospora* on the above medium. This effect has been further studied, and it has been found that the immediate cause of the inhibition was the presence in the medium of 2×10^{-2} *M* potassium (as the dihydrogen phosphate). This was demonstrated by excluding potassium from the medium, adding the phosphate as the sodium or ammonium salt. The mould then developed into dense colonies; these were not, however, quite so large as those grown on normal medium (containing potassium) in the absence of yeast. This reduction in size was due to the fact that *Oospora* required 3×10^{-4} *M* potassium ions for optimal growth on ammonium succinate, mineral salts, agar medium. When Yeast 557 was present, however, this concentration of potassium, added as sulphate or chloride to the medium (containing sodium or ammonium dihydrogen phosphate), inhibited the growth of the mould. The inhibition was largely overcome by the addition of 5×10^{-4} *M* aluminium (as ammonium alum) to the normal medium.

A similar effect was obtained with other salts of aluminium, but not with salts of other multivalent elements, calcium, magnesium, manganese or silicon. The concentration of aluminium required to counteract the inhibition indicated that the action was not a trace-element effect. In fact there was sufficient aluminium to envelop each yeast cell 10^3 times. The mechanism of the action of potassium and the counteraction by aluminium has not been elucidated.

The suggestion[2] that potassium might regulate cell permeability offered no obvious clue to the problem. Rossi[3] showed that potassium ions stimulated the oxidation of succinic acid in resting cells of *Escherichia coli* in the Warburg apparatus. It seemed possible that some oxidation product of succinic acid might be formed in this way by Yeast 557 and be inhibitory to the growth of *Oospora*. The addition to the medium of 4×10^{-3} *M* fumaric acid or of 4×10^{-2} *M* maleic acid produced no inhibition of the mould.

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Detection of Uric Acid in the Tissue Homogenates of Earthworms

Lesser[1], working on *Lumbricus agricola* and *Allolobophora foetida*, Ackermann and Kutscher[2] on extracts of tissues of earthworms, Delaunay[3] on excreta of earthworms, Heidermanns[4] on tissues of *Lumbricus*, Bahl[5] on excreta of *Pheretima*, Abdel Fattah[5] on tissue homogenate of *Lumbricus*, were all unable to detect the presence of even traces of uric acid in these worms. Only Cohen and Lewis[7] found that the non-protein nitrogen excreted by *Lumbricus*