Table 1. RATES OF GROWTH OF DIFFERENT STRAINS OF ECTROMELIA VIRUS IN THE LIVER PARENCHYMAL CELLS OF DIFFERENT STRAINS OF MOUSE

Virus strain	Mouse strain	Rate of growth in liver parenchymal cells $\log_{10} ID_{50}$/h	Significance of difference of growth-rate by Student t test	Ref.
Hampstead mouse (virulent)	Bagg (inbred)	$0{\cdot}056 \pm 0{\cdot}006$	n.s.d (with Hampstead egg (attenuated))	5
Hampstead egg (attenuated)	Bagg	$0{\cdot}052 \pm 0{\cdot}008$		5
Hampstead egg	W. and E. H. I. (outbred)	$0{\cdot}079 \pm 0{\cdot}010$	Significant at 2·5 per cent level (between the two groups)	
Hampstead egg	W. and E. H. I. (maintained in cold environment)	$0{\cdot}089 \pm 0{\cdot}016$	n.s.d. (among last three)	
Moscow (virulent)	W. and E. H. I.	$0{\cdot}077 \pm 0{\cdot}005$		6

W. and E. H. I., Walter and Eliza Hall Institute, Melbourne strain. n.s.d., no significant difference.

virus, growth of virus in liver parenchymal cells depends on the strain of mouse.

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SOIL SCIENCE

Effect of Soil Mesh-size on the Estimation of Mineralizable Nitrogen in Soils

IT is generally accepted that the most satisfactory methods now available for assessment of the potential ability of soils to provide nitrogen for crop growth are those involving estimation of the mineral nitrogen formed when soil is incubated under conditions that promote mineralization of soil nitrogen[1,2]. Methods involving incubation under aerobic conditions at 28°–35° C for 2–4 weeks have been generally preferred, and numerous investigations of factors affecting the results obtained by these methods have been reported[1,2]. However, very little attention has been given to the effect of soil mesh-size, and many workers have not considered it necessary to describe the method used to grind and sieve soil samples for estimation of mineralizable nitrogen by incubation techniques. Published work on the effect of mesh-size appears to be confined to rather limited investigations by Fitts[3] and Hagin and Halevy[4], which indicated that mesh-size is of minor importance. This conclusion is not supported by the work reported here.

The soils used in our work were mainly black earths from the Darling Downs, Queensland, but they included a variety of Canadian and U.S. soils. Most comparisons were made by using samples ground to pass a 10-mesh screen and samples prepared by grinding the < 10-mesh soil to pass an 80-mesh screen, but comparisons using the 10–30 mesh fraction of < 10-mesh soil and samples prepared by grinding this fraction to pass an 80-mesh screen were included. Nitrogen mineralization during incubation under aerobic conditions was estimated by a method similar to that described by Bremner[2]. Nitrogen mineralization during incubation under waterlogged conditions was estimated by the method described by Waring and Bremner[5].

Typical results are shown in Table 1. It can be seen that a decrease in soil mesh-size resulted in a marked increase in the amount of nitrogen mineralized under aerobic or water-logged conditions. With 52 soils examined, a decrease in mesh size from < 10 to < 80 led to a

Table 1. EFFECT OF SOIL MESH-SIZE ON MINERALIZATION OF NITROGEN DURING INCUBATION OF SOIL UNDER AEROBIC AND WATER-LOGGED CONDITIONS

Soil: Type and location	Great soil group	Mesh-size	Nitrogen mineralized on incubation at 30° C for 2 weeks (p.p.m. of soil): Aerobic conditions	Water-logged conditions
Houston silty clay, Texas	Rendzina	< 10	30	52
		< 80*	45	75
Melfort silty clay loam, Saskatchewan	Chernozem	< 10	49	64
		< 80*	65	88
Webster clay loam, Iowa	Brunizem	< 10	21	41
		< 80*	28	68
Fargo silty clay, Minnesota	Chernozem	10–30	30	37
		< 80†	45	77
Waco clay, Queensland	Black earth	10–30	31	48
		< 80†	43	60

* Prepared by grinding < 10 mesh soil.
† Prepared by grinding 10–30 mesh soil.

25–124 per cent increase in the amount of nitrogen mineralized during incubation under water-logged conditions at 30° C for 2 weeks.

The results in this work show that the importance of soil mesh-size in the estimation of mineralizable soil nitrogen by incubation methods has been underestimated and that it is essential to standardize the method of grinding and sieving soil samples for this estimation. They also indicate that some of the organic matter in soil aggregates is not susceptible to microbial decomposition until the aggregates are disrupted by grinding or other processes that render this organic matter physically accessible to micro-organisms.

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PSYCHOLOGY

Response Learning

ALL theories of behaviour have to make predictions about observable responses. Despite the arguments of Kendler[1], this should not be allowed to conceal the fact that different behaviour theories differ radically as to the rules by which they determine membership of a response class. If we are to go on using the term 'response' for the units of behaviour among which we seek orderly relationships, it is important that we should be clear what we mean by it.

Two extreme views are possible. We may characterize a response by the movements it involves (allowing, perhaps, some degree of response generalization). There has been evidence for many years[2–4] that this is not always satisfactory. We may, on the other hand, identify responses by the goal to which they take the animal, having no regard to the sequence of movements used. This view has acquired new interest recently through the publication by Deutsch[5] of a structural theory of behaviour in which the response is essentially tropistic.

In a situation where two routes of equal length lead from a single starting section to a common end-box, and the animal is rewarded for taking one route, but not the other, the two kinds of theory predict differently. If the 'response' which is reinforced is a set of movements, the problem presents no difficulty; but if a 'response' is a goal-directed tropism, no consistent solution is possible. It follows from Deutsch's theory that an animal will be unable to choose between two routes of equal length leading to a common goal when it has had experience of both