and the diameter of the stem. No oviposition has been recorded in stems outside the diameter range of 0·2–0·4 cm. ; rings may be cut on stems of diameter up to 0·5 cm., but these do not generally exceed 0·4 per cent of the total. This clearly indicates the role of mandibles in the selection of diameter of stem for oviposition, and consequent susceptibility to damage.

Loss of plant height is therefore regulated by the actual seat of oviposition in the stem within the range of susceptible diameter. Frequencies of occurrence of height classes lost with susceptible diameter classes at the level of the lower ring show that the highest frequency lies in the height range 10–20 cm. and stem diameter 0·26–0·3 cm.

With susceptibility restricted to the apical part of the stem, loss of fibres becomes insignificant with older crops. It has been estimated that, in the young crop, loss of stem may be up to 30·02 per cent ; in older crops, it is 6·32 per cent on the average.

Pre-ovipositing operations and feeding on the veins of the leaves by the adults, leaving the softer tissues intact, produce symptoms so specific that they may be taken as a field key for identification.

Crotalaria juncea, C. saltiana, Hibiscus cannabinus, Æschynomene aspera and *Sesbania ægyptiaca* have been recorded as alternative host plants.

Fuller details will be published later. Thanks are due to Dr. B. C. Kundu, director of the Institute, for his helpful suggestions.

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Bacterial Invasion

LET it be assumed that : (*a*) each organism invading a host has a chance λ of reaching a favourable site, and of afterwards undergoing a sequence of events which enable it to proliferate and result in the death (or infection) of the host ; (*b*) each organism acts independently ; (*c*) *c* inhaled organisms are necessary to produce the death (or infection) of 0·5 of the total of exposed animals ; (*d*) the experimental animal population is large and homogeneous. Then the proportion *S* of animals remaining uninfected after the intake of *n* organisms each is given by :

$$S = (1 - \lambda)^n,$$

and by definition $0·5 = (1 - \lambda)^c$.

Expressing *n* in units of *c*, that is, $n = fc$,

$$S = (1 - \lambda)^{fc} = 0·5^f.$$

Where invasion by pathogens is through the respiratory system, these conditions might well apply. The argument is not invalidated by consideration of the case of many organisms grouped in one particle, since once the particle is deposited on a moist surface the cluster usually disintegrates and each organism has an independent subsequent history.

For the purpose of comparison with existing data on experimental respiratory infection available to me, the curve $S = 0·5^f$ was plotted on the conventional probit–log dose plane. The curve shows a slight upward concavity, but is almost straight between

Table 1. SLOPES OBTAINED BY EXPOSURE OF ANIMALS TO CLOUDS OF ANTHRAX SPORES (REF. 1)

Animal	Size of particle inhaled	Slope ± 2σ range
Guinea pig	Single spore	1·26–2·13–3·0
,,	3·5 μ	1·31–2·44–3·57
,,	4·5 μ	0·59–1·26–1·93
,,	8 μ	1·67–2·54–3·41
,,	12 μ	0·72–1·25–1·78
Monkey	Single spore	1·45–3·19–4·93
,,	12 μ	0·32–1·17–2·02

Table 2. SLOPES OBTAINED BY EXPOSURE OF GUINEA PIGS TO CLOUDS OF SINGLE ORGANISMS OF THE *Brucella* GROUP (REF. 2)

Organism	Slope ± 2σ range
Br. suis	0·26–1·17–2·08
,,	1·64–2·86–4·08
,,	1·47–2·61–3·75
,,	1·41–2·54–3·67
Br. melitensis	0·99–1·76–2·53
,,	0·51–1·54–2·57

the ED_{25} and ED_{75} values, having a mean slope of approximately 1·9. Tables 1 and 2 show experimental values of slopes for comparison.

It will be observed that in twelve of the thirteen results quoted, the slope value of 1·9 given by the theoretical curve lies within the 2σ range of the experimental results.

If the hypothesis outlined be true, it follows that the infection or mortality among a batch of animals exposed to a given bacterial cloud depends upon the total number of organisms deposited in the respiratory tract of the host, and not upon the time taken to deposit them. This, of course, will not be true if the time of exposure is made sufficiently long for immunity processes stimulated by the early depositions of organisms to influence the fate of those deposited later. Thus for a batch of animals exposed to a bacterial cloud, it would be expected that a constant mortality or infectivity would be obtained if the aerosol concentration (*C*) × time of exposure (*t*) = constant.

Results supporting this conclusion have been quoted by Goldberg and Watkins³ using *Streptococcus zooepidemicus* and *Klebsiella pneumoniæ*, while a value of $C^{(1·1 \pm 0·06)}t = $ const. has been obtained for *B. anthracis* spores and guinea pigs by workers¹ in this department.

Expressed in its logarithmic form, the equation becomes :

$$\log S = -0·301 f.$$

It is suggested that bacteriologists, particularly in the field of respiratory infection, might consider whether a simple plot of log survival against dose might provide adequate linear representation of their results, as was found to be true for the results the slopes of which are given in Tables 1 and 2.

I am indebted to Dr. D. W. Henderson and Mr. S. Peto for help and advice, and to the Chief Scientist of the Ministry of Supply for permission to publish this communication.

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