



# CONTROL OF RATS AND MICE

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VOLUME 2

RATS

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CONTROL OF  
RATS AND MICE

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## ABBREVIATIONS

A.R.C.	Agricultural Research Council
A.L.D.	Average Lethal Dose
Antu	$\alpha$ -naphthylthiourea
B.S.	British Standard
B.S.I.	British Standards Institute
B.S.T.	British Summer Time (G.M.T. + 1 hr.)
D.B.S.T.	Double British Summer Time
L.A.	Local Authority
L.D.	Lethal Dose
M.A.F.	Ministry of Agriculture and Fisheries
M.O.F.	Ministry of Food
M.O.H.	Medical Officer of Health
M.O.S.	Ministry of Supply
P <sub>3</sub>	Protected Poison Point
P.L.H.A.	Port of London Health Authority
R.C.T.	Rat Control Test
S.A.L.A.M.	Société Anonyme Levant-Africaine Méditerranée
W.A.E.C.	War Agricultural Executive Committee

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strengthened the decision to employ prebaiting before poisoning or trapping. Apart from these practical applications a problem of great biological interest was obviously involved, to which a good deal of study was devoted for its own sake. In addition, many accidental discoveries resulted from our field experience before the extraordinary sensitiveness of wild rats to many forms of environmental change was fully realized. We have used the term 'new object reaction' to describe this suspicious behaviour. Although the rat may react in the same way to changes other than the actual introduction into the habitat of new objects, the reaction was first noticed by us under these conditions, and the term has been retained as a convenient label, although it is not completely satisfactory.

The other types of change observed to produce this reaction in the rat were: moving familiar objects to new positions, replacing of one object with another almost identical one, alteration in the position of the food site, changes of food, and even simple changes in the habitat such as sweeping up a dirty floor. All these cause a change in behaviour until the rats accustom themselves to the new situation.

This natural suspicion of the brown rat towards anything unusual in its surroundings was reflected in many of the experiments by a decrease in the amount of bait eaten on the night after the disturbance, compared with normal feeding. When watching was carried out, the behaviour of individual rats confirmed the view that this slackening in feeding was due to suspicion; and it was discovered that changes in the environment could be appreciated at night. More recently Southern, Watson, and Chitty (1946), using infra-red radiation, found that new objects were apparently not discovered at such a great distance in darkness as they were in light.

Although most of the changes causing the reaction were spatial in nature, changes in lighting also produced alteration in behaviour, but in a less striking manner.

It is first necessary to dispose of the suggestion that the reason for the suspicion of the rat towards new objects placed in the environment is human odour caused by the handling of the objects by man. VENABLES carried out an experiment in which two series of tunnels were used, one freshly treated with human saliva and well handled each time before baiting; the other scrubbed, rubbed well with horse, cow, or pig dung, and handled only with aniseed-soaked gloves. Entrances and bait-takings were recorded for both sets of tunnels, and it was found that there were seventy-three entries into tunnels with human odour, and seventy-six into the tunnels without it. BOULENGER (1920) describes a similar experiment. Ten gin traps and ten nipper traps, half of which were handled freely, and half with gloves after being rubbed in earth and faintly scented with aniseed, were set in a rat infested locality. As a result, thirty-six rats were found in those traps which had been handled in the ordinary way, compared with thirty-one in those handled in gloves.



These experiments, showing that in the course of several days rats approached equally well objects which had and had not been handled with bare hands are not quite the same as demonstrating complete avoidance of an untouched object. One such example was the refusal of rats to cross a trail of plaster of Paris freshly shaken out of a tin; and there have been other cases where the amount of handling was negligible. Moreover, since in the majority of environments many objects, including food, are frequently handled, it is difficult to believe that human odour is a cause of alarm.

### (b) Deterrents

It would not be surprising if it were found that a degree of new object reaction could be caused among rats through the sense of smell. Thus the introduction into the environment of substances with odours strange to the rats might discourage them from indulging in their usual activities for some time. Very little information of a precise nature has been gathered on this aspect. However, the literature on repellents contains many recommendations of such chemical deterrents as powdered sulphur, lime, lye, copperas, creosote, carbolic acid, kerosene, and oils of peppermint and wintergreen (Brians, 1938). The question arises whether the effect, if any, of these substances is due to their 'newness' in the environment, or to their intrinsic unpleasantness to the rat.

Ford and Clausen (1941) discuss the use of *n*-butyl mercaptan, the active ingredient of the odour of skunk. White rats faced with food treated with the volatile substance refused to eat until the odour had disappeared; they appeared excited, and the hair rose on their backs. Rats on a farm refused, for 4 months, to touch food smeared with a mixture of honey and mercaptan. Rats on a city dump ate the treated food after 3 days. Here the food supply was limited and the number of rats large; it is also suggested that the rats here may have been conditioned to the odour of mercaptans from decaying organic materials. The effect observed in these tests may have been due to a dislike of the associations evoked by the odour, or of the odour *per se*, rather than new object reaction towards an unfamiliar factor in the environment.

There are some superstitions about rat repellents which may have had as their original basis an observed new object reaction. Thus the belief that a deer skin laid on the floor will keep off rats (Anon., 1777) may have arisen because on some occasion when this was done a new object reaction kept the rats away. A circle of sawdust, 6 in. wide, sprinkled with creosote, has also been recommended to keep rats from attacking stacked foodstuffs.

The duration of the effect of these chemical deterrents, which appear to operate through the sense of smell, seems to be the most hopeful index to their nature: whether they are distressing to the rat or are treated with suspicion because they are novel. If the first alternative is operating, one would expect the effect to last until the odour was removed or ceased to be potent. If the second suggestion is the right one, then it would be expected that the