

be because they are more neurotic than non-anxious subjects, or it may be because they are more introverted. If the former were true, then all neurotic subjects would condition better than normal ones; if the latter were true, then dysthymic neurotics would condition readily and hysteric and psychopathic neurotics would condition poorly. Thus the present experiment is a crucial one. It would seem that conditionability is related to introversion-extraversion (which in its turn is related to cortical excitation-inhibition) and not to neuroticism. Support for this conclusion is given by the fact that introverted normal subjects condition better than extraverted normal subjects. If conditioning is related to cortical excitation, then drugs such as caffeine should increase conditionability, and drugs such as sodium amytal should decrease conditionability. The tentative conclusions from a small pilot study carried out in this laboratory upon sixteen subjects, using intravenous sodium amytal, would suggest that, as predicted, one effect of this drug is to reduce the conditionability of the subjects.

In this preliminary study of sodium amytal and conditioning, the effects of practice and of varying the size of the amytal dose were also considered. An additional variable incorporated into the experimental design was the effect of using a placebo injection. All these variables were related to changes in personality as measured by questionnaire scales such as the Maudsley Medical Questionnaire (neuroticism) and Guilford's *STDCR* scales (introversion-extraversion and neuroticism). Another interesting finding is that this drug apparently has an effect upon the retention of, or ability to form, conditioned eye-blink reflexes as manifest in the re-test situation. In a future study it is hoped to confirm and relate this finding to certain aspects of learning by rote carried out under comparable experimental conditions.

Pavlov demonstrated that certain cortical operations in his dogs resulted in an increase in inhibition and a consequent decrease in conditionability. This would suggest that certain types of brain damage in human subjects, or certain brain operations, such as prefrontal leucotomy, would also result in a decrease in ease of conditionability.

Perhaps it is of interest to mention here that Mrs. A. Petrie, of the Institute of Psychiatry, has carried out an investigation into the effect on personality of a variety of brain operations*. Her published results to date have shown that the personality measurements associated with the dysthymic type change consistently in the direction of extraversion after excisions in the frontal lobe but not after excisions in the cingulate and certain other areas. Included in one of her current projects—carried out in association with Mr. R. A. Willett at this Institute—is an investigation into changes in eye-blink conditionability following on these brain operations.

The programme of the conditioning laboratory includes further experiments with drugs which act as cortical excitants or depressants, and with drugs which increase or decrease sympathetic nervous activity. It is hoped to relate the changes in personality and in conditioned response behaviour caused by these drugs to simultaneous changes in the subjects' electro-encephalograms. It is also hoped to condition reflexes other than those already mentioned. If sufficient reflexes are investigated, covering both central and autonomic nervous systems (each

subject would be conditioned upon each reflex separately), then it should be possible to establish the existence or otherwise of a general factor of conditionability in man.

* Pavlov, I. P., "Conditioned Reflexes" (trans. by G. V. Anrep) (London: Oxf. Univ. Press, 1927).

† Pavlov, I. P., "Lectures on Conditioned Reflexes", 1, "The Higher Nervous Activity (Behaviour) of Animals" (trans. by W. H. Gantt) (London: Laurence and Wishart, 1927); 2, "Conditioned Reflexes and Psychiatry" (trans. by W. H. Gantt) (New York: International Publishers, 1941).

‡ Eysenck, H. J., "The Scientific Study of Personality" (London: Routledge and Kegan Paul, 1952); "The Structure of Human Personality" (London: Methuen, 1953).

§ Spence, K. W., and Taylor, J., *J. Exp. Psychol.*, 42, 183 (1951). Spence, K. W., and Farber, I. E., *J. Exp. Psychol.*, 45, 116 (1953).

¶ Welch, L., and Kubis, J., *J. Psychol.*, 23, 83 (1947); *J. Nerv. Ment. Dis.*, 105, 372 (1947).

‡‡ Petrie, A., "Personality and the Frontal Lobes" (London: Routledge and Kegan Paul, 1952).

THE WATER SUPPLY OF LONDON

THE easy way of providing a bacteriologically pure domestic water supply is to own or control a gathering ground in a remote and uninhabited district—say, in central Wales—to prohibit farming on it and the access of the public to it, and after storage, to treat this water by filtration and chlorination before it is distributed. The extension of farming during the Second World War and, since then, the increasing numbers of people who want to walk, cycle or motor in the less-inhabited parts of Great Britain have made it difficult to adhere to this policy in its extreme form; the Central Advisory Water Committee of the Ministry of Health recognized this in a report published a few years ago, and recommended that, though the public should not have general access to the banks of storage reservoirs, they should be allowed access to the remainder of a gathering ground*.

Even with this relaxation, however, the water undertaker with a catchment area in a remote district is still in a much more fortunate position than the water authority of London—the Metropolitan Water Board—which supplies about one-sixth of the population of Britain. Its raw water is drawn mainly from the Thames and the Lee—rivers, alkaline in reaction, flowing through lowland farming country, and polluted by sewage effluents and industrial discharges—bacteriologically unsafe, therefore, at the source, and an excellent medium for the growth of algae. From this raw material the Board produces a treated water acknowledged to be of the highest quality. How this is done is explained in the informative and detailed reports of the Board's Director of Water Examination, of which the thirty-fifth has recently been issued†.

Partly, of course, it is done by providing first-class treatment plant and by carrying on continuous research to improve the design and operation of it. But, in addition, the Director of Water Examination has on his staff teams of bacteriologists, biologists and chemists who keep an almost continuous watch on the quality of the water, from the river to the consumer's tap. The amount of work involved in this is prodigious; during 1952, for example, more than forty-five thousand samples of water were examined bacteriologically.

* Central Advisory Water Committee: Report of Gathering Grounds Sub-Committee. (London: H.M.S.O., 1948.)

† Metropolitan Water Board: Report on the Results of the Bacteriological, Chemical and Biological Examination of the London Waters for the Years 1947-1952. (Thirty-fifth Report.) Pp. 116 + 2 plates. (London: Staples Press, Ltd., 1955.) 15s. 6d.

A similar effort is needed to prevent trouble from the growth of algae which, when present in large numbers, may greatly reduce the rate at which water can be passed through sand filters, and may also give rise to very objectionable tastes. Frequent counts of algae are therefore made—in the Lee Valley reservoirs, for example, twice weekly—and from these observations and from the results of chemical determinations (particularly of silicate) it is now usually possible to judge when to take action which will prevent a major nuisance from occurring. Intermittent chlorination, addition of copper sulphate, and the drawing off of water from a particular depth in a reservoir are some of the means used to combat algal troubles. To be effective, however, action must be taken at precisely the right time, and the report makes it clear how very close a watch has to be kept on reservoirs and rivers for this to be possible.

In judging the bacteriological safety of a water supply, many factors are taken into account, but the chief criterion is the number of *Bacterium coli* type I present in unit volume. It is natural, therefore, that much research should have been carried out in the laboratories of the Metropolitan Water Board to improve the methods of determining the numbers of this organism in a sample; the present report includes accounts of comparative tests with media containing peptone from different sources, of tests with a chemically defined medium incorporating glutamic acid, and of a rapid test using Brilliant Green bile broth. This 'rapid' test, however, still occupies two days; it is evident that the development of really rapid methods of enumerating bacteria would be of immense service in the control of a water undertaking.

This report is the last to be presented by Lieut.-Colonel E. F. W. Mackenzie, who became Director of Water Examination in 1939 and who retired recently. His term of office thus included the period of the War when the intricate system of sewers, water mains and treatment plants on which the health of London depends was under concentrated bombardment. It was then, of course, that the meticulous system of testing and control, for which London's water authority has for so long been famous, had its most severe test; in the result, throughout the War no single case of disease which could be attributed to the water supply was ever reported.

AGERATUM HOUSTONIANUM AS A TEST OBJECT FOR GROWTH-SUBSTANCES

H. P. BOTTELIER (*Annales Bogorienses*, 1, 3, 185; 1954), using *Ageratum houstonianum* Mill as a test plant in studies of the action of growth-substances, has investigated the relation between the epinastic curvature of the petioles and the concentration of indole acetic acid, and the effect of light thereon. He has observed that the magnitude of the curvature for a given growth-substance concentration depends on the illumination during the reaction and on the age of the leaves, the first adult leaf pair giving the highest values.

The higher the concentration of the growth-substance solution used, the greater the light intensity at which light saturation takes place. Two processes

can be distinguished in which the action of the growth substance leads to an epinastic curving: in one of these light is essential, so that in the dark no curving takes place and the maximum curving appears after illumination for about twenty-four hours; in the other, curving takes place in the dark and is completely inhibited by light after four hours illumination.

In young leaves (second leaf pair) only the first process occurs, while as the leaves become older the second process becomes more and more important. Accordingly, petioles of young leaves do not curve in the dark, but do so strongly in light; as the age increases, the ability to curve in the dark increases and with the sixth leaf pair is equal to that in light. The sensitivity to illumination diminishes fairly rapidly when the petioles are kept in the dark in growth-substance solutions. With short illumination at the beginning of the experiment the curvature is smaller the shorter the illumination. Both phenomena can be explained quantitatively from the rate at which the growth substance is taken up by the petioles, if it is assumed that the growth substance is dealt with directly after it has been taken up, in light according to the first process, in the dark according to the second.

In an investigation of the synergism of indole and indole-3-acetic acid in the rooting of isolated leaves of *Ageratum houstonianum*, M. H. Van Raalte (*ibid.*, 167) has observed that the rooting of petioles of *Ageratum* induced by indole-3-acetic acid was enhanced by the addition of indole. Indole did not increase the effect of naphthalene-1-acetic acid on rooting. The oxidation of indole-3-acetic acid by a crude enzyme extract from etiolated pea seedlings, as determined with the Warburg manometric method, was decreased by the addition of indole. It is suggested that the enhancing effect of indole on the rooting of *Ageratum* induced by indole-3-acetic acid is caused by its decreasing effect on the oxidation of this growth substance in the plant.

RED LECHWE AND CHINESE SIKA

ONCE more the Fauna Preservation Society directs attention to two animals which are in danger of declining to the point of extinction (*Oryx*, 3, No. 1; March 1955). The first is the red lechwe (*Onotragus leche leche* Gray), the position of which in Northern Rhodesia is described by W. F. H. Ansell. The second is the Chinese sika, varieties of which range from the forests of tropical Formosa to the northern snows of east Siberia; concern for each variety is expressed by Richard Glover.

The lechwe is probably the most typical of Northern Rhodesian antelopes and, according to the Director of Game and Tsetse Control for this territory, numbers have declined alarmingly in recent years. Human agents are mostly responsible for this decline, Europeans blaming Africans and Africans Europeans. Legal enactments now make it difficult for Europeans to kill red lechwes on any great scale and the only large-scale killing is the native lechwe drive, or 'chila', a traditional African way of hunting. Originally, the chila did little more than take the surplus crop of game. To-day the hunting of lechwe has become a commercial proposition, and large numbers of immature animals are being slaughtered.