THE LONDON MENTAL HOSPITALS

A separate volume is concerned with the Council's services for the insane and the mentally defective.² The population left within the county tends to be raised, and tinues to increase, although the population within the administrative county is declining. The explanation is that large numbers of the migrants to the out-county areas are young persons, so that the average age of the population left within the county tends to be raised, and in such a population the number of persons coming under permanent care because of decay of mental power is bound slightly to increase. The lessened death rate in mental hospitals is also a factor. On the average of the past five years 172 additional beds a year are required in the mental hospitals, whose total population on December 31st, 1933, the last date covered by this report, was 21,523.

From the statistical tables some interesting facts emerge concerning these persons. If they are classified in 10-year age groups, the largest numbers are found between the ages of 45 and 54. Four-sevenths of the total are single persons, and one-twelfth are widowed. Among the certified patients the males are in the majority up to and including the age group 25 to 34, but after that the females show a sharp rise, and in the later ages, from 65 onwards, their numbers are double those of the males. Among the few voluntary patients the sex incidence is different, the males being in the majority at all ages, but the numbers are so small that no conclusions can be drawn. The 10-year age group in which the largest number of deaths of patients occurred in the year under review was from 55 to 64, and the group in which the largest number of recoveries were recorded was from 45 to 54. During the year 1,038 patients were discharged recovered and 1,333 died. Statistics are given showing the discharges on recovery during the last thirty-nine years. Since 1895 39,155 patients have been discharged as "recovered," of whom 12,476 have been readmitted to a London mental hospital, 4,312 of them within twelve months of their discharge.

Of the patients now in these mental hospitals 649 are of foreign nationality, more than one-third of them Russians. Very little use has been made in London of the powers under the Lunacy Act enabling patients to be boarded out in the care of relatives or friends. Only nineteen such patients were boarded out in 1933, of whom five relapsed. Rather more use is made of the other section of the Act permitting long leave of absence, and forty-two patients have been granted such leave under the arrangements of the Mental After-Care Association and the Central Association for Mental Welfare.

CARE OF THE FEEBLE-MINDED

In its capacity as local mental deficiency authority, the Council was called upon to deal with 1,216 new cases in 1933. The total number of living defectives who had been ascertained as subject to be dealt with, or who might become subject to be dealt with, was 16,019, of whom 6,073 were in institutions. A rather surprising list of occupations followed by defectives under statutory supervision is given; it includes factory hands and workers in some trades involving quite special skill, such as tailors, milliners, plumbers, and wireless workers, and even travellers and canvassers are represented in the list. The fact that with so large a population of mental defectives not in institutions only seventy-eight cases were cited at the police court in which mental defectives were charged with criminal offences seems a sufficient answer to those who lightly assume that feeble-mindedness must be associated with criminal instincts.

² Ibid., vol. vi. Mental Hospitals and Mental Deficiency. P. S. King and Son, Ltd., Westminster. (1s.)

In an appendix to the report Dr. F. L. Golla, pathologist to the mental hospitals and director of the central pathological laboratory, describes a number of investigations which have been proceeding in different mental institutions, the results of some of which have already been published in various medical journals. He states that the pessimism with which the investigation of insanity is sometimes regarded is unjustified, witness the manner in which insanity due to syphilis has yielded to treatment, and the value of treatment in an increasing number of cases in which mental disorder is found to be due to bacillary conditions. He adds that there are indications that certain other forms are referable to the disequilibrium of the organs of internal secretion, and that these should, when better understood, be amenable to organotherapy; while in the yet more numerous class of mental disease due to profound disturbances of the metabolic processes, these disturbances are being studied with a view to treatment. But while the amount of public money spent on the maintenance of the insane is in the neighbourhood of seven millions a year, the expenditure on research is at present very small when compared with that obtaining in other branches of medicine.

VINETHENE

BY

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The anaesthetic properties of certain unsaturated ethers have been studied by Leake and Chen,¹ who in 1930 predicted that a compound combining the chemical characteristics of ethylene and di-ethyl ether—namely, divinyl oxide or vinyl ether—would be a general anaesthetic, and better than any unsaturated ether with a greater number of carbon atoms in the side-chains.

The preparation of pure vinyl ether was undertaken, and has been described, by Ruigh and Major.² Considerable difficulties were experienced before success rewarded their persistence. The physical properties, vapour pressure, and electric moment of vinyl ether have been investigated and determined by Miles and Menzies³ and Smyth and Walls,⁴ whilst its anaesthetic properties and pharmacological action have been investigated in mice and dogs by Knoefel, Guedel, and Leake.⁵ They found in dogs evidence of less irritation than with chloroform or ethyl ether. Cardiac action was but slightly affected, even in relatively deep anaesthesia, while the blood pressure was well maintained even after respiration had stopped for ten minutes. Respiration spontaneously recovered after withdrawal of the anaesthetic. The disturbance of the acid-base equilibrium and of the blood sugar was slight. When administered by the drop method to dogs, anoxaemia being likely, slight pathological changes were noted in the kidney, but when given for two hours or more, or daily for ten days for thirty minutes, by the carbon dioxide absorption technique, no abnormality was noted in any tissue examined. They conclude that in rapidity of action, in production of relaxation, in promptness of recovery, and from the point of view of physiological and pathological effects, vinyl ether is superior to chloroform or ether.

ACTION ON HUMAN BEINGS

To Samuel Gelfan and Irving R. Bell⁶ of the University of Alberta, Canada, belongs the credit of investigating its action on humans. After obtaining a supply of the pure product from Professor C. D. Leake of the University of California, where the original research was carried out, Gelfan inhaled vinyl ether on two occasions, for periods of ten to eighteen minutes; it was also given to a

volunteer, Dr. Winifred Hughes, for five minutes. A few minutes after the withdrawal of the anaesthetic, which had been administered to the point of producing unconsciousness, muscular relaxation, and loss of skin reflexes, recovery was complete, without vomiting or nausea, and both subjects were able to continue their duties shortly after the anaesthesia. They concluded that the result of the animal experiments by Leake and his associates, and their own experiences, showed that vinyl ether was worthy of a clinical trial.

Goldschmidt, Ravdin, Lucke, and others⁷ have shown that the concentration of vinyl ether in the blood of the dog necessary to produce anaesthesia is 28 mg. per 100 c.cm. of blood, of ethyl ether 116 mg. per 100 c.cm., of chloroform 37.5 mg. The anaesthetic potency of vinyl ether is thus about four times that of ethyl ether, and is slightly greater than that of chloroform; in the human, according to these authors, the potency is seven times that of ethyl ether. The ratio between the anaesthetic concentration and the point of respiratory failure in the dog is 2 : 4, as compared with 1.0 : 1.3 for ethyl ether; for chloroform the ratio between the anaesthetic dose and the point of cessation of cardiac action is 1.0 : 1.5. Their pathological studies in dogs and monkeys are of considerable interest, and have a definite bearing upon the place that vinyl ether may find in anaesthetic practice.

Liver necrosis of the same type, but less extensive than that following chloroform anaesthesia, has been found in well-fed dogs after two to three hours' anaesthesia, but not after shorter periods. Monkeys, whether well fed or starved, show complete immunity. Bromosulphalein dye tests of liver function in parturient women, and in dogs after repeated administration, point to the harmlessness of vinyl ether.⁸

REPORT ON ITS USE

A supply of this anaesthetic was generously placed at the disposal of the Anaesthetic Committee of the Medical Research Council and of the Royal Society of Medicine in 1933 by Messrs. Merck and Company, U.S.A., who are the manufacturers; further supplies have been sent from time to time. The preparation has been given the name of "vinethene." At a recent meeting of the committee Dr. Hans Molitor, the pharmacologist, and Dr. Randolph Major, the chemist, who were making a short stay in London, were present by invitation, and gave the latest information about vinethene to the members, two of whom—Dr. C. F. Hadfield and the writer—have been using it for some months. The committee has also furnished supplies to Dr. C. Langton Hewer, who has used it in eighty cases; and it has also been used in a few cases by Dr. H. Featherstone, Dr. A. L. Fleming, Dr. I. Magill, Dr. L. D. Marston, and Dr. H. J. Simmons. Their reports are incorporated in this paper.

Vinethene is vinyl ether, $\text{CH}_2 : \text{CH.O.CH} : \text{CH}_2$, with the addition of 3.5 per cent. of absolute alcohol and 0.01 per cent. of a non-volatile oxidation inhibitor. It is a clear, colourless liquid, except for a purple fluorescence, having a specific gravity of 0.77 and a boiling point of 28.3°C . It possesses a characteristic odour (of garlic), is highly inflammable, and is about as explosive as ether. Its vapour is denser than air. It should be kept in well-stoppered containers in a cool place, remote from lights and fires. It should also be kept free from contact with the slightest trace of acid, since it is decomposed by acids to form aldehydes, one of which is formaldehyde. Vinethene left in a bottle should not be used more than twelve hours after the bottle has been opened. It is possible that this precaution is no longer necessary, as Dr. Randolph Major informed the committee that he thought the problem of stabilizing vinethene had been solved. At the present moment, however, it would be wiser to maintain this precaution, for it is clear from the literature and from a knowledge of the chemical formula that the manufacture of pure vinyl ether is troublesome, as it is highly reactive.

Vinethene has been used in several thousand cases in the United States and in Canada, and in 314 cases by the collaborators of this report. The ages of the patients in our series have ranged from 2 to 78 years, and the operations have covered almost the whole field of surgery.

It is a most interesting anaesthetic. It possesses the best characteristics of ethylene and of ether without their disadvantages, being extremely rapid in action, not unpleasant to inhale, non-irritating to the respiratory passages, with a theoretically wide margin of safety—even when given to the stage of overdose—and a rapid recovery free from unpleasant after-effects, particularly vomiting. Induction is quiet, and consciousness is lost after a few inhalations. The anaesthetic concentration in the blood is rapidly reached. Complete muscular relaxation has not always been obtained. Respiration is quiet and regular; the rate is often faster than is met with during ether anaesthesia. The fall of blood pressure is slight.

"OPEN" OR "CLOSED" ADMINISTRATION

Vinethene can be given by the open method, being dropped on to the mask at the rate of about sixty drops per minute, or can be used by the closed method, allowing oxygen or nitrous oxide and oxygen to flow through or over it. A preliminary administration of atropine is recommended, although it is not essential for quite short administrations. Morphine and atropine can also be used. Its extreme volatility renders it a wasteful anaesthetic by the open drop method, except for brief anaesthesia—for example, in out-patient surgery, or in infants and young children—further, an even anaesthesia is difficult to maintain. Owing to the slight risk of impairment of the liver function if the oxygen content of the blood is cut down, the manufacturers recommend that vinethene should not be given by the open drop method for more than thirty minutes. This instruction clearly visualizes a method which should more rightly be called "semi-open."

No doubt this precaution could be relaxed if oxygen were given throughout the administration, but this method offers, as already suggested, no advantages over the closed method with oxygen, which provides economy of consumption and smooth anaesthesia. The manufacturers also recommend that this method should not be used for more than one and a half hours. Two deaths from liver necrosis occurred at the Johns Hopkins Hospital, Baltimore: the duration of anaesthesia was respectively two hours forty minutes and one hour forty minutes. I have administered it combined with nitrous oxide and oxygen for one hour thirty-two minutes, for an operation for cholecystitis on a man aged 73 years, suffering from jaundice; he made a perfect recovery. I have also given it combined with avertin, nitrous oxide and oxygen, on two occasions, for operations on the gall-bladder, and on sixty-two other occasions for abdominal, renal, prostatic, and other operations. In no case has harm resulted.

In this connexion it is of interest to note that avertin belongs to a group of drugs which have a toxic action on the liver: the combination of avertin and vinethene should therefore, on theoretical grounds, be dangerous. Clinical experience, however, lends no support to the view, based upon pharmacological and slight experimental evidence, that avertin is appreciably toxic to the liver. Even in the presence of liver damage it has been used without apparent harm.⁹ Our experience with vinethene is in agreement with that of Goldschmidt, Ravdin, and Lucke, who have had no evidence of liver damage after any of their 461 administrations, and with the experimental and clinical findings of Bourne.⁸ No impairment of kidney function has been noted by us after its use for prostatectomy, nephrectomy, or pyelolithotomy. Cardiac disease is not a contraindication. The absence of pulmonary complications is a striking feature. One of us (C. L. H.) anaesthetized a boy suffering from bronchopneumonia following measles for a bilateral acute mastoid operation. He made an uninterrupted recovery.

DANGER OF OVERDOSAGE

It is essential to bear in mind that owing to the high volatility and potency of vinethene the amount necessary to produce anaesthesia is very small, particularly when it is given by the closed method. Experience with it

should be gained in minor surgery before more lengthy cases are undertaken. A death from asphyxiation following overdose was reported from St. Mary's Hospital in 1934. A useful and unmistakable sign of commencing overdose is the onset of rapid shallow breathing; this is quickly relieved in consequence of rapid elimination, and should not cause undue anxiety, as cardiac action continues for several minutes in animals after cessation of respiration. In the ill or enfeebled patient, however, recovery may not be so prompt or so certain, although it should compare favourably with ether in this respect. Death takes place from respiratory failure.

*Recovery, even from deep anaesthesia, takes place in a few minutes; the possibility of pain must be foreseen and met by a timely injection of a sedative. The smell of vinethene has proved objectionable to some surgeons and anaesthetists. It can be removed by the addition of oil of bitter orange, or oil of peppermint, immediately before administration, or largely prevented by the use of the carbon dioxide absorption technique.

CONCLUSIONS

1. Vinyl ether has been shown in animals to be a good anaesthetic with a wide margin of safety. In overdosage the respiration stops before the heart. Metabolism is not seriously affected.

2. It is highly inflammable.

3. In man the evidence up to date shows that vinyl ether is a good anaesthetic, is not irritating to the respiratory passages, usually provides adequate muscular relaxation, and shows a remarkable absence of after-effects, particularly vomiting.

4. Owing to potency and rapidity of action greater care has to be exercised to avoid overdosage than is the case with ethyl ether.

5. Whatever method of administration is employed, anoxaemia must be avoided.

6. Until further clinical experience has been gained vinyl ether should not be used for periods longer than one hour and a half, in view of the slight possibility of damage to the liver.

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The annual report for 1933-4 of Livingstone College, Leyton, states that eighty-three missionary students received training in the twelve months with a view to their being able to render simple medical services to outlying districts which are entirely without hospital facilities. The College also instructs those about to proceed to work over-seas with regard to the preservation of health in tropical or otherwise unhealthy climates. The report contains extracts from letters from Brazil and India, illustrating the value of the training thus rendered possible. It is being generally recognized that the larger mission hospitals, staffed with medical practitioners, cannot meet all the urgent needs of sick folk in the remote forest villages and jungle settlements, and that their work can be most usefully supplemented by those who have had such special training as Livingstone College provides. The sessions last for one year, for six months, or for three months, according to the amount of time the students can spare. There is also a month's vacation course, while some are accommodated for even shorter periods when necessary.

India

Bombay Mental Hospitals

The various mental hospitals in the Bombay Presidency were so grossly overcrowded during 1933 that it was found necessary to abrogate the arrangements by which patients had been received hitherto from other provinces. The principal types of mental disorder or defect treated were mania (898), melancholia (551), dementia praecox (324), insanity due to *Cannabis indica* or its derivatives (121), delusional insanity (126), idiocy (49), and imbecility (155). The total population of the mental hospitals during the year under review was 2,895, as compared with 2,284 in 1932. In his general report on these institutions Lieut.-Colonel K. G. Gharpurey, I.M.S., officiating surgeon-general with the Government of Bombay, points out the gratifying fact that the readmissions in 1933 numbered only twenty-five as compared with eighty-four. A summarized report of the Central Mental Hospital at Yeravda is published as an appendix to the report. In it attention is drawn to the high rate of recoveries compared with the number of direct admissions—namely, 38.8 per cent.—while the rate of those discharged as “improved” was 21.5 per cent. In view of the overcrowding, financial stringency, staff shortage, and other prevailing handicaps these figures are considered exceptionally good. The length of residence of patients in the hospital who were discharged as “recovered” ranged from fifteen days to ten years, while that of patients discharged as “improved” ranged from twenty-one days to thirteen years. The respective numbers of patients discharged as “recovered” and “improved” with less than three months' residence were thirty-three and nineteen, while those with less than six months' residence numbered thirty and twelve, a rate of 32.6 of the total admissions. This ratio is regarded as very satisfactory, since experience has shown that, when more than six months' stay in a mental hospital is thought necessary the diagnosis is usually psychosis of a grave or very chronic nature. The medical staff has not been increased since the hospital was opened, though the number of patients has been trebled; the facilities for treatment cannot therefore be considered as good. Occupational therapy occupies a prominent place in treatment, and the value of team games has been evident. The hospital is well supported by local residents, who take an active part in organizing social events within its walls and excursions outside.

Preventive Medicine in Assam

Colonel J. P. Cameron, I.M.S., inspector-general of the civil hospitals of Assam, supplies in his report for 1933 examples of the progress of preventive medicine along various lines. The Government continued its grant of 25,000 rupees to the Assam Medical Research Society, which has actively investigated problems associated with malaria, cholera, and dysentery; its work on pneumonia and the anaemia of pregnancy had to be discontinued owing to lack of funds. A cheap method of malaria control by the use of rice bran as a diluent for Paris green was tried, and proved successful, but field experiments on the value of plasmoquine in reducing malaria were indecisive. In the plains of Assam, where often the vector mosquito incidence is high and the infectivity rate is considerable, treatment with plasmoquine to reduce the number of gametocyte carriers is of doubtful value owing to constant reinfection. In one area, however, the mosquito rate has been reduced, and there plasmoquine appeared to be of definite value in decreasing the numbers of gametocyte-carrying children. Bacteriophage continued