over-all measurements (with thirty-gallon cylinder) are as follows: height, 19 inches; breadth, 9 inches; depth, 6 inches.

The Machine in Use

The compactness and lightness of the machine enable it to be carried with ease to the patient's room and placed alongside him on the locker or bedside table. After the patient is asleep and on the journey to the theatre the anaesthetist can take the apparatus along with him without being incommoded by a weighty and cumbersome anaesthetic machine, and with the comfortable feeling that should undue respiratory depression manifest itself during the journey it can be rapidly and easily countered on the spot. Should this need arise, the supply cock on the cylinder having been turned on, the face-piece is detached from its socket and applied to the patient's face firmly but without undue pressure. Next the control key is pressed for a second or two and then released, exactly as is the emergency button on a McKesson. By this means an artificial inspiration is produced and the lungs are inflated with oxygen. The face-piece is then lifted slightly and a natural expiration takes place. This manœuvre is repeated as often as is necessary at regularly spaced intervals of a few seconds each. As a rule two or three insufflations are all that is needed before every trace of cyanosis disappears and normal colour and function are restored.

The above apparatus is also very useful, and all that is required to be taken along, when a pure pentothal anaesthesia is decided upon, which nowadays seems to be the case on an increasing number of occasions. For such an anaesthesia a complex apparatus for the administration of nitrous oxide, ether, cyclopropane, etc., is unnecessary, and can safely be left in the car, thus avoiding the trouble and exertion inseparable from carting into the nursing home and setting up heavy anaesthetic machinery suitable for the administration of an inhalation anaesthetic. This question assumes really major importance in the absence of porters (which seems to be a regrettably frequent occurrence), especially if the day be hot and the anaesthetist late!

Conclusions

Pentothal is now generally agreed to be without appreciable effect on the heart (Mallinson, 1937; Pratt and others). Some workers, it is true, have described occasional irregularities on electrocardiographic investigation which do not appear to be of any great significance (Kohn and Lederer, 1938). Others, however, do not confirm this finding (Volpitto and Marangoni, 1938). The drug is nevertheless capable of producing considerable respiratory depression, especially after heavy premedication or excessive dosage; but it is only when the means to correct the resulting anoxaemia promptly and adequately are lacking that respiratory depression may bring in its train myocardial damage and cardiac failure, with the resultant collapse of the patient and all its attendant perils. If such means are at hand, and, what is more, in a form sufficiently light and easy to carry about, little fear of any major respiratory complication arising during anaesthesia need be felt.

Statistics with regard to intravenous anaesthesia now exceed 8,000,000 administrations (Jarman, 1939), and tend to show that this type of anaesthesia compares favourably with any other form, with the possible exception of gas-and-oxygen, in respect of mortality.

Finally it is claimed that the constant presence of a source of oxygen under controlled pressure during intra-

venous narcosis materially adds to the already excellent margin of safety possessed by this type of anaesthetic.

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THE VALUE OF INBRED MICE IN RELATION TO THE GENERAL STUDY OF MAMMARY CANCER

BY

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Much progress has been made in recent years in the elucidation of the mechanisms involved in the origin of mammary cancer. This is due largely to the availability of a number of inbred strains of mice in which the females exhibit a high tendency to the spontaneous development of this type of cancer. The value of such animals to the experimentalist lies in their short life-span and in the ease with which a large number of tumour-bearing animals can be obtained. Provided there is good evidence that the processes concerned with the high incidence of mammary cancer in these mice represent only an exaggerated form of the processes operating in widely outbred mice (which are comparable with human stock), then it is permissible to apply the results of such studies to the elucidation of the problem in the human subject.

Varying opinions have been expressed as to the relation between genetically pure strains and outbred mice. Cramer and Horning (1937) state that "there may be differences between the aetiology of mammary cancer in mice of mixed strains and those of specially inbred strains with an inherited high susceptibility to mammary cancer." The basis for this suggestion is their opinion that in outbred mice the condition is a local disease curable by operation, whereas in inbred mice it is a general disease with local manifestations and cannot be cured by operation. Gye (1937) supports this view and states that conclusions drawn from observations on inbred mice cannot be applied without reserve to cancer in normal mixed stocks.

Sampson Handley (1938) reported the history of a family of five sisters with a strong predisposition to breast cancer; three of them suffered from double primary carcinoma of the breast. He suggests that the history of this family recalls the high incidence of breast cancer in certain inbred strains of mice, and shows that surgical treatment was of value in spite of the strong constitutional predisposition. He also states that in his experience double primary breast carcinoma in the human being is not confined to cases in which the family predisposition is especially strong.

Description of the Experiment

In view of the importance of this aspect of breast cancer an experiment was undertaken in which a comparison was made of the after-histories of outbred stock mice and mice of highly susceptible inbred strains following the surgical removal of a breast cancer. Twenty-eight hybrid mice were obtained from dealers and each bore one or more mammary adenocarcinomas, of which the diagnosis was confirmed microscopically. An undertaking was obtained that the mice had not been specially bred with a view to increasing the incidence of breast cancers. The coat colours varied and the ages were not known, but it was estimated that all were fully grown. Twenty-four tumour-bearing mice from inbred susceptible strains at present maintained in this laboratory were also available. The ages ranged from 27 to 85 weeks. Surgical removal of the tumours was performed and all the mice were observed until death.

Results of the Experiment

A comparison of the results in the two groups of mice is rendered difficult for two reasons. The post-operative survival of the outbred mice was rather shorter than that of the inbred mice (Table I). Especially did a greater

TABLE I.—*Distribution of the Mice according to the Week of Death following Operation*

		Interval between Operation and Death in Weeks						Average Interval between Operation and Death, in Weeks
		5 or under	6-10	11-15	16-20	21-25	26-30	
Number of mice dying	Inbred	6	1	8	3	3	3	14.4
	Outbred	3	11	8	0	5	1	12.2

proportion of outbred mice die before the expiration of the tenth week after the operation, after which time at least half of the tumours in both groups appeared; therefore their opportunity to develop a second tumour was not quite so good as in the inbred group. Four of the outbred mice bore two or more tumours at the time of operation, whereas only one inbred mouse bore two tumours. This is probably due to the fact that a weekly inspection of the inbred stock is made and tumours are discovered early, while dealers only inspect their stock with a view to discovering tumours when a special demand is made. These mice with two or more tumours at the time of operation are included in the group developing second tumours because it has been found that tumours in two sites rarely occur simultaneously, and had the mice been subjected to operation earlier the second tumour would have developed after operation.

The results of the experiment are given in Table II. Local recurrence after operation occurred with approxi-

TABLE II.—*Development of a Second Tumour after the Surgical Removal of a Primary Tumour*

Type of Mouse	Total Mice in Experiment	Recurrence at Same Site after Operation		Development of Second Tumours†		Number of Mice Bearing:		
		No.	Per cent.	No.	Per cent.	Two tumours	Three tumours	Four tumours
Inbred	24*	6	25.0	16	66.7	7	6	3
Outbred	28	8	28.6	10	35.7	7	2	1

* The inbred mice belonged to three strains: white label (Kreyberg), 5 mice; RIII (Dobrovolskaia-Zavadskaja), 14 mice; Bagg albino (Little), 5 mice.

† Includes mice which bore two or more tumours at the time of operation.

mately the same frequency in the two groups. Second tumours—that is, another breast cancer at a site removed from the primary site—appeared in 66.7 per cent. of inbred mice and 35.7 per cent. of outbred mice. This difference is sufficiently great to be of statistical significance. In both inbred and outbred groups were examples of individuals developing two, three, and four breast tumours.

Discussion

The numbers of mice used in this experiment are necessarily small, but it is shown that outbred mice, while possessing a less marked tendency to develop multiple breast tumours than inbred mice, nevertheless do develop more than one tumour in approximately one-third of cases. Outbred mice, like those inbred, may bear one, two, three, or even four mammary tumours. These facts would appear to support the view that the differences between outbred and inbred mice are of a quantitative rather than of a qualitative order. This would be in accord with genetic experience that inbreeding in itself exerts no harmful influence on a stock, but tends to exaggerate certain characteristics which, if of a harmful nature, may in the long run adversely affect the stock.

Summary

The question of the desirability of using highly susceptible inbred strains of mice for the experimental elucidation of the problems of breast cancer is discussed.

An experiment undertaken to discover whether outbred differ from inbred mice in their tendency to develop mammary cancer in other sites after the surgical removal of a primary mammary cancer is described.

The results of the experiment suggest that the difference is a quantitative rather than a qualitative one, and that the high degree of susceptibility of inbred strains to breast cancer is merely an exaggeration of the disease as it appears in outbred mice.

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As already mentioned in these columns, the American Academy of Arts, in compliance with the provisions of the will of the late Francis Amory, announces a prize, to be known as the Francis Amory Septennial Prize, to be awarded for conspicuously meritorious work performed "during the immediately preceding septennial period, through experiment, study, or otherwise, in the treatment and cure of diseases and derangement of the human sexual generative organs in general, and more especially for the cure, prevention, or relief of the retention of urine, cystitis, prostatitis, etc." While the donor wished especially to reward the discovery of any new method of treatment, he expressly authorized that the prize might be given to any author who might have contributed a theoretical or practical treatise of exceptional value and merit on the anatomy or the treatment of diseases of the genital organs. If there is work of a quality to warrant it the first award will be made this year. The total amount will exceed 10,000 dollars, which may be divided at the discretion of the Academy among several nominees. While formal nominations are not expected and no essays or treatises in direct competition for the prize are desired, the Amory Fund Committee invites suggestions, which should reach it not later than May 15, 1940, and should be sent care of the American Academy of Arts and Sciences, 28, Newbury Street, Boston, Massachusetts, U.S.A.