

it was found that the fat was entirely depleted, there were no adhesions and the wound was cleanly healed.

In five rats a very small portion of one gland was left *in situ*. All these rats survived; there was never loss in weight throughout the period they were under observation. Rat ♀ GH4126 is typical—at time of operation it weighed 167 grams, and now, 125 days after operation, it weighs 193 grams and is in excellent condition.

This, however, does not rule out the possibility of the presence of accessory adrenal tissue, and that such tissue may have taken over the function of the normal gland. To test this point we transplanted a small fragment of adrenal tissue within the ovarian capsule, inserting it through a small slit. In five successful transplants the animals showed no loss in weight and appeared indistinguishable from normal animals for an indefinite time. Two of these rats are still living and are in perfect condition. Three were observed for approximately a month, at the end of which time the ovary containing the transplant was removed. Had accessory tissue been present, these three rats should have survived, since the second operation did not involve the site of the first, and removal of one ovary does not interfere with the normal condition of the animal. But following the removal of the ovary, in each case, there was the gradual loss in weight characteristic of adrenalectomized animals, and the usual train of symptoms appeared. One died within eight days. The other two died within fifteen days.

This work shows that the rat is no exception to the rule; it does not survive complete adrenalectomy, and that very small fragments left *in situ* or successfully transplanted within the ovarian capsule suffice to keep the animal alive and in good condition.

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THE METABOLISM OF THE BRUCELLA GROUP IN SYNTHETIC MEDIA

MANY important questions concerning the biology of the *Brucella* group remain unsolved. As a part of an extensive program an effort has been made to analyze the elementary food requirements according to the principles evolved by Braun. After considerable experimentation a series of synthetic media in which 22 strains of the *Brucella* grow freely have been developed. Doubly distilled water, highly purified chemicals and Pyrex glassware have been used in the experiments. The growth, although moderate in

the first generation, has improved after the fifth passage, indicating a gradual adaptation of the strains to the protein- or peptone-free environment. The following facts are worthy of note.

Cystine is one of the essential N-sources. Asparagine in combination with cystine enhances multiplication. Sodium or ammonium citrate serve as carbon and energy sources. Cultures of recently isolated strains are obtained provided sodium carbonate and potassium acid phosphate is mixed in concentrations which will give a pH of 7.0. In all probability the CO₂ thus evolved fulfils the requirements of the sensitive strains. Twenty parts per million of iron either as ferrous or ferric ion has a stimulating effect. Glycerol is not indispensable but in concentration of 2 per cent. enhances the growth of every *Brucella* type. Physical and not chemical factors are responsible for the growth-promoting properties of this alcohol. The surface tension and physical consistency of the substratum play an important rôle. In liquid synthetic media the growth is sparse but the addition of 0.2 per cent. agar repeatedly washed in distilled and redistilled water accelerated the multiplication many fold. In this connection it is of interest that progressively increasing amounts of agar diminish the growth until it is completely inhibited at 1.5 per cent. concentration. A semisolid synthetic medium with 0.1–0.3 per cent. agar permits the cultivation of recently isolated CO₂ tolerant strains to grow at the normal oxygen tension of air.

The details of the various experiments on the N and S requirements, C and energy sources, essential cations and anions, optimal surface tension, osmotic pressure, utilization of carbohydrates, intramolecular respiration together with growth curves will be published in the *Journal of Infectious Diseases*.

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BOOKS RECEIVED

- BUCHANAN, ESTELLE D., and ROBERT E. BUCHANAN. *Bacteriology for Students in General and Household Science*. Third edition. Pp. xvi + 532. 243 figures. Macmillan. \$3.00.
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