1 cm. in diameter. This was boiled for 15 minutes while the diathermy thermo-element was held outside of the sterilizer. Subsequently the unit was washed with water and green soap, after which it was submerged in a 1:400 solution of merthiolate for 15 minutes.

The new design does away with the use of any material for holding the unit on the blood vessel (Fig. 1). After the blood vessel is carefully isolated, it is momentarily collapsed and slipped through the slit in the top of the diathermy thermo-element. This modified diathermy thermo-element rides on the vessel, maintaining electrical contacts in spite of any movements of the animal. Holes may be drilled in the corners or sides of the unit for suturing it firmly so as to keep it from slipping along the blood vessel.

This modified diathermy thermo-element is much easier to manipulate and can be applied in considerably less time than the original unit. It has been found particularly convenient for measuring flow of blood in the thoracic portion of the inferior vena cava where movements with large amplitude occur. These units are applied, employing the usual sterile surgical technic and ether anesthesia. After the effects of the anesthesia have worn off, the flow of blood returns to normal and measurements of the flow may be carried on for several days. Undoubtedly the measurements under these conditions may be said to be more nearly normal than those made by any method thus far developed.

6812

Development of Transplanted Rat Eggs.

J. S. NICHOLAS.

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The first experiments employing transplantation of mammalian eggs were reported by Heape[1] more than 40 years ago. He transferred the eggs of an Angora rabbit into the uterus of the Belgian hare. Similar work is reported by Hammond[2]. As a part of the program of work on the development of the rat, this experiment has been repeated as a test for egg viability and its capacity for continued development. The transplantations were performed between

[1] Heape, *Proc. Roy. Soc.*, 1890, **58**.

[2] Hammond, *Verh. d. 1er Internat. Kaninschenzüchten-Kongr.*, 1930.

white and hooded rats in order that the pigmentation could be used as a decisive criterion of the original maternal origin of the developing eggs. Since pigmentation develops at the close of the first half of pregnancy, it is not necessary to carry the young completely through the gestation period to study the survival of the transplanted eggs.

The animals are mated and the Fallopian tube of one side is removed from both the donor and the recipient females at the desired interval after fertilization; the eggs are secured from the Fallopian tube and the donor's eggs (hooded) are transferred to the recipient's (white) uterus. The effects of the operative procedure have been tested and the results show[3] that one horn of the uterus can be removed without disturbing the development of the embryos contained within the opposite horn. The horn of the uterus can be transferred to a subcutaneous environment[4] without interfering with the development of the subsequent litter. Further tests were made under the conditions peculiar to the present experiment and the Fallopian tube of one side was removed at the close of the third day of the gestation period. The young develop in the horn of the side of operation and were born alive in nearly 90% of the cases (13 litters out of 15) with no change in the length of the gestation period.

The experiments fall into 3 groups; (1) those in which the recipient and donor eggs were in equivalent stages; (2) those in which the transplanted eggs were of a later stage than those found in the tubes of the recipient; (3) those in which the donor eggs were of a stage earlier than those of the recipient. These 3 series of transplantations give definite differences in result.

The transplantations are performed when the donor eggs (hooded) are in the 2 and 4 cell stages, 48 hours after the formation of the copulation plug. The eggs from the Fallopian tube of the recipient are removed and the stage of their development determined. The donor (hooded) eggs are then inserted into the recipient's uterine horn by means of a pipette.

The transplanted eggs when equivalent in stage to those of the recipient implant normally in the uterus and frequently maintain their normal growth rate. In five such experiments in which 18 eggs were transplanted development proceeded normally in 60% of the embryos.

[3] Nicholas, *Anat. Rec.*, 1925, **31**.

[4] Nicholas, *Sci.*, 1931, **74**.

When the eggs from the donor (hooded) strain are of a later stage than those of the recipient animal, only 10% developed (2 out of 20 egg transplants).

When the eggs from the hooded strain (donor) were transplanted at a stage younger than those secured from the recipient animal, implantation occurred in 80% (16 out of 20). In these cases, some of the eggs of the recipient animal had entered the uterine horn before the donor eggs (hooded) were introduced. The embryos from the 2 sources were spaced at regular intervals in the uterine horn. The development of the donor (hooded) embryos was, however, noticeably retarded when compared with those developing from the recipient (white) mother.

Development was permitted to continue to the end of the period of gestation in several cases and the young were born normally. In the cases in which the eggs of the donor and recipient were of the same stage of development, the young were all born at the same time. When the donor eggs were of later stage than those of the recipient the gestation period was not completed in any experiments so far performed. The donor eggs which were transplanted when they were in an earlier stage of development than those of the recipient were born later than the ones normal to the recipient. The maximum interval so far obtained is 48 hours, resulting in the prolongation of pregnancy to that extent as well as involving a separate second birth process 2 days later than the first.

Further experiments are in progress to determine how far this process of increasing the gestation period can be prolonged by varying the differences in the ages of the donor and recipient.

6813

Oxygen Consumption of Egg: A Quantitative Study of Oxygen Consumption of Single Developing Eggs (Orthoptera).

J. R. BURKHOLDER. (Introduced by J. H. Bodine.)

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Respiratory metabolism has been determined and correlated with the morphological development of single grasshopper eggs (*Melanoplus differentialis*) from the time of laying to hatching at constant temperature of 28° C.

A rhythmic rise and fall in the oxygen consumption occurs dur-