amplitude of the individual contractions increased markedly under cooling and diminished under heating. The other four experiments were negative.

Thus far then we have established a definite cerebral influence over the volume of the uterine cavity. The fact that this appears to be largely if not entirely a control of the voluntary musculature of the abdomen does not detract from its importance in connection with the birth process.

Returning to the morphin question, we have now given small subcutaneous doses of this substance in two animals which had responded well to cerebral cooling and heating in the manner above described. Here the morphin, given to unanesthetized animals, resulted in a depression of the uterine activity, although the dose was so small in one case (.01 gram per kilo) that the animal remained sitting upright and occasional normal limb movements continued to occur. Cerebral cooling now had no effect upon the volume of the uterine cavity of these morphinized animals, showing clearly how morphin can influence labor by a central action.

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Endomixis in diverse races of Paramaecium aurelia.

By LORANDE LOSS WOODRUFF.

[*From the Osborn Zoölogical Laboratory, Yale University.*]

Woodruff and Erdmann in 1914[1] described a normal periodic reorganization process without cell fusion, which they termed endomixis, in *Paramaecium aurelia*. This study was based chiefly on pedigreed cells from Woodruff's 5,000-generation race of *Paramaecium aurelia*, though specimens of a race of this organism isolated by Erdmann in Germany showed the same phenomenon.

The present communication is to prove the general occurrence of endomixis in races of *Paramaecium aurelia*, since this has been questioned, on a priori grounds, by certain authors.

The following races of *Paramaecium aurelia*, in addition to those mentioned above, have now been studied:

Oberlin Race. Isolated at Oberlin, Ohio. Carried in pedi-

[1] *Loc. cit.*

greed culture from October 8, 1914, to date, during which time it has attained 951 generations.

Bryn Mawr Race. Isolated at Bryn Mawr, Pa. In pedigreed culture from January 7, 1915, to February 8, 1916, when it was discontinued at the 650th generation.

Oxford Race. Isolated at Oxford, Ohio. Pedigreed culture started on July 16, 1915, and has to-day (May 24, 1916) attained the 779th generation.

Woods Hole Race. Isolated at Woods Hole, Mass. Pedigreed culture begun on August 11, 1915, and discontinued on January 14, 1916, at the 305th generation.

Each of the above races has shown endomixis at the regular rhythmic periods throughout its culture and therefore this additional data from races from diverse sources fully corroborates the statement of Woodruff and Erdmann[1] that "this reorganization process is a normal phenomenon and probably occurs in all races of the species *Paramaecium aurelia*."

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Further investigations on the cyclic changes in the mammalian ovary.[2]

By LEO LOEB.

[*From the Department of Comparative Pathology, Washington University, St. Louis, Mo.*]

In former investigations I have described cyclic changes in the ovaries of the guinea pig which depend largely upon injurious influences exerted upon the ovaries in the period directly pre-

[1] Woodruff and Erdmann, "Complete Periodic Nuclear Reorganization without Cell Fusion in a Pedigreed Race of *Paramaecium*," PROC. SOC. FOR EXPER. BIOLOGY AND MED., Vol. 11, 1914 (preliminary paper). Erdmann and Woodruff, "Vollstandige periodische Erneuerung des Kernapparates ohne Zellverschmelzung bei reinlinigen Paramaecien," *Biol. Centr.*, Bd. 34, 1914 (preliminary paper). Woodruff and Erdmann, "A Normal Periodic Reorganization Process without Cell Fusion in *Paramaecium*," *Journal of Exper. Zoology*, Vol. 17, No. 4, 1914 (complete paper).

[2] During the summer 1915 serial sections of a number of ovaries were made for me in the department of anatomy of Washington University. I wish to express my appreciation to Dr. R. T. Terry for placing the facilities of his laboratory at my disposal.