type, and in which the corresponding cells are both homoblastic and equivalent. When the cells, though homoblastic, wholly change their equivalence, or when the cleavage-pattern itself wholly changes, the original homology disappears.

Degeneration in Paramœcium and so-called 'Rejuvenescence' without Conjugation: Gary N. Calkins.

Two individuals, A and B, of *Paramœcium caudatum,* from different sources, were isolated February 1, 1901. These were fed on twenty-four-hour hay-infusion and the number of divisions recorded at periods of from one to three days throughout the year, one individual being isolated each time. At the present time (December 30) A is in the four hundredth and B the three hundred and sixtieth generation, and no conjugation has taken place in the direct line of my cultures. Thus far the experiments have yielded the following results:

1. *Paramœcium* unquestionably passes through more or less regular cycles of activity and weakness.

2. The period of weakness is preceded by one of greater dividing activity.

3. The period of weakness ends in death, provided the diet (hay-infusion) remains the same.

4. Beef-extract restores the weakened functions of growth and division, without conjugation.

5. Normal conjugation between A and B, if followed by the same diet (hay-infusion), does not restore these weakened activities, but is soon followed by death.

6. Exogamous conjugation between wild gametes, and followed by hay-infusion diet, results in normal growth, division and life.

7. Endogamous conjugation does not differ from exogamous conjugation. The ex-conjugants live and divide normally if fed for a time with beef-extract, but die if fed directly with hay-infusion.

8. One intracellular effect of beef-extract upon weakened *Paramœcium* is the formation of 'excretory granules.' Another is the disintegration of the macronucleus.

9. A few conclusions to be drawn are: (*a*) A change of diet is necessary for continued vital activities. (*b*) What we may call parthenogenesis, or the development of gametes without fertilization, may be induced by change of diet. (*c*) Conjugation by itself does not 'rejuvenate.' (*d*) Conjugation probably has some other significance than that usually accepted; what this significance may be is not indicated thus far by my experiments.

Note on Metamerism of the Vertebrate Head: W. A. Locy.

The Median Bundle of the Olfactory Nerve in Elasmobranchs: W. A. Locy.

Fertilization in the Pigeon's Egg: E. H. Harper.

In the pigeon's egg, polyspermy has been found to occur normally. The supernumerary sperm nuclei migrate to the periphery of the germinal disc and give rise to an accessory cleavage. They differ from the cleavage nuclei in the fact that their rate of division is more rapid; in being surrounded by wide areas of liquefaction; in having a finer chromatin network and more slender and elongated chromosomes; and in possessing one-half the somatic number of chromosomes. In their later history as yolk nuclei they divide amitotically. Never more than one sperm nucleus conjugates with the egg nucleus.

In the earliest stage of the fertilized egg observed, the egg was within the mouth of the oviduct. The first polar spindle was present and was surrounded by many sperm nuclei. Spermatozoa penetrate the egg most readily within the region occupied by the germinal vesicle in the ovarian egg, and the pronuclear phenomena also occur about within the limits of this region.