seconds respectively just before injecting the oxygen. It is seen that the oxygen tolerance was not increased by this procedure. No blood studies were made in these dogs.

Calculations are made that indicate that the minimal fatal dose of oxygen should not be greater than that of air when injected rapidly into the peripheral vein of a dog. The results of 24 injections of air or oxygen into 18 dogs show no marked difference in toxicity.

7606 C

Studies on Centrifuged Frog Eggs.

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The effect of centrifuging fertilized eggs of the frog both before cleavage and during the early cleavage stages has been studied by several investigators. Gurwitsch,[1] Hertwig,[2] Wetzel,[3] Morgan,[4] Konopocka,[5] McClendon,[6] and Jenkinson[7] particularly have reported the redistribution of certain materials and the intense stratification of others along the primary axis of centrifuged frog eggs. They state that the stratification of materials takes place in the order of their relative specific gravity, *i. e.*, a yellow or white centripetal layer, a translucent protoplasmic middle layer and a heavy yolk centrifugal layer containing the black pigment granules. In general, the results of these investigators show that, when the centrifuging has been relatively weak, development is often apparently normal with perhaps a slight abnormal pigmentation and distribution of fat in the head region. However, if the centrifugal force has been slightly greater, curious monsters often appear. Jenkinson particularly has noted that the myotomes and spinal ganglia are frequently fused together beneath the nerve tube and that the notochord is often absent altogether. Hertwig frequently obtained monstrosities of the spina bifida type. Pasquini and Reverberi[8] have centri-

1 Gurwitsch, A., *Verhandl. Anat. Gesellsch.*, 1904, **18**, 146.

2 Hertwig, O., *Arch. f. Mikr. Anat.*, 1904, **63**, 643.

3 Wetzel, G., *Arch. f. Mikr. Anat.*, 1904, **63**, 636.

4 Morgan, T. H., *Arch. f. Entw.-Mech.*, 1906, **22**, 553.

5 Konopocka, B., *Bull. Int. Acad. Crac.*, 1909, Ser. B., 689.

6 McClendon, J. F., *Arch. f. Entw.-Mech.*, 1909, **27**, 247.

7 Jenkinson, J. W., *Quart. J. Micr. Sci.*, 1915, **60**, 61.

8 Pasquini, P., and Reverberi, G., *Boll. Inst. di Zool.*, Univ. Roma, 1929, **7**, 1.

fuged frog eggs at the gastrula stage and obtained many curious monsters not unlike some that have appeared in our experiments.

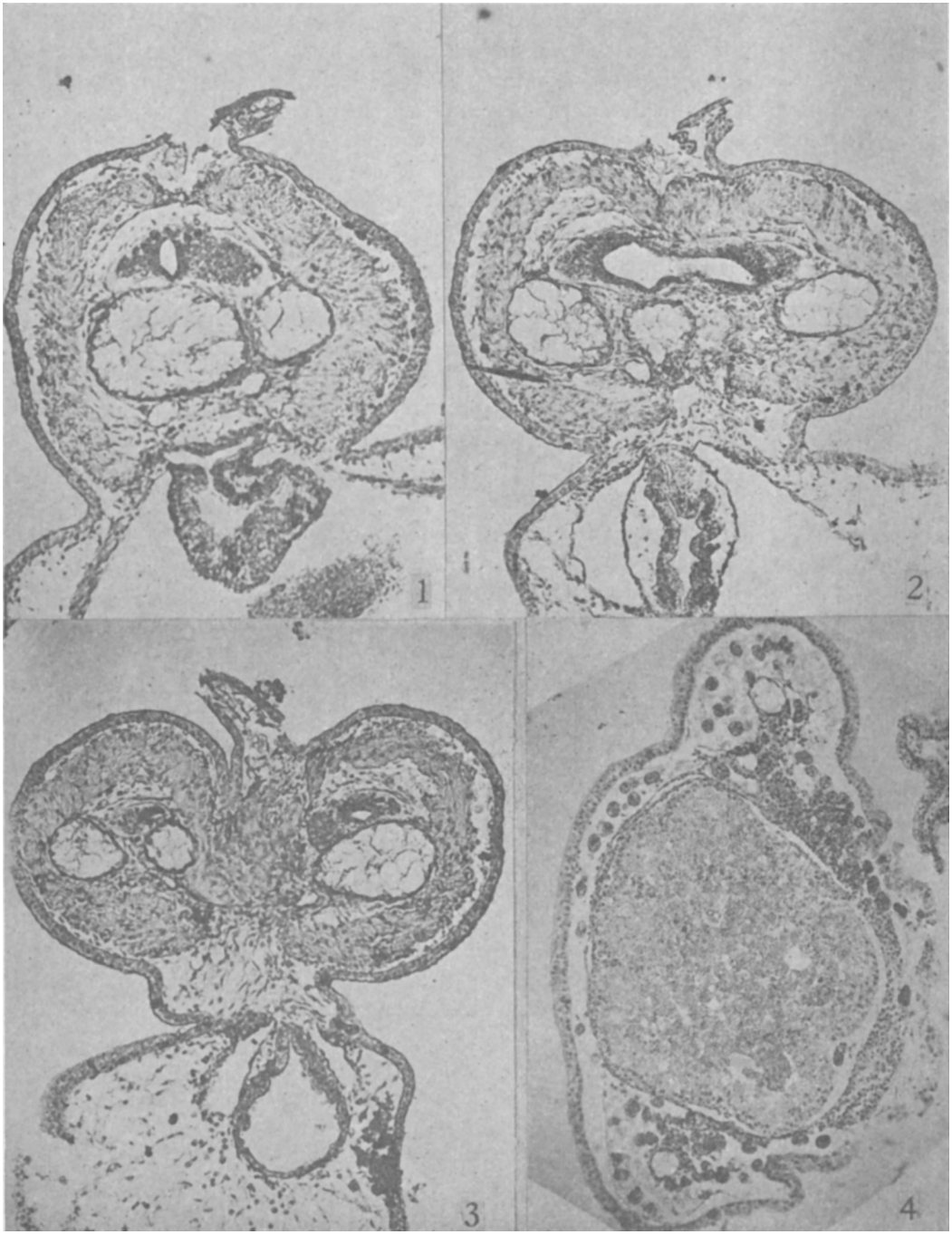
We have recently centrifuged unfertilized frog eggs of *Rana aurora* for 2 minutes at 40 pounds pressure in the air-driven ultracentrifuge described by Beams, Weed and Pickles.[9] It has been possible to repeat the stratification of materials in the frog egg as described by the above named investigators. Furthermore, we have produced a complete cleavage or fragmentation of the egg into a light fatty fragment and a heavier yolk and protoplasmic fragment. No effort has been made to determine whether or not such fragments may be fertilized and if fertilized will develop. When stronger centrifugal force is applied the fragments are completely forced out of the jelly and burst.

In another series of experiments the eggs of *Rana pipiens* in the many cell and early gastrula stages were centrifuged for 5 to 7 minutes at about 2000 times gravity. Such eggs often develop into monsters, many of which possess 2 and sometimes 3 tails. Figure 1 is a cross section through the region of the base of the tail of such a tadpole. It will be noted that the neural tube is single but shows some indication of spreading and becoming divided as in Figures 2 and 3 which are serial sections of the same tadpole taken slightly more caudad. The notochord has already doubled in Figure 1, and in Figures 2 and 3 the right notochord has divided so that there are 3 distinct notochords with 2 neural tubes. Sections taken cephalad show the neural tube and notochord to be single.

Figure 4 represents a cross section of another tadpole of a similarly treated group of eggs preserved at a slightly earlier period in development. There are two distinct notochords present but no trace of a neural tube. In this animal the brain showed distinct malformation and the neural tube extended posteriorly only for a very short distance. Other monstrosities with no heads and expanded growths of epidermis into folds and ridges were found. In still other cases the yolk was collected in the blastopore region forming an unusually large and persistent yolk plug which prevented the normal closure of the blastopore.

No special effort was made to orient the eggs in the centrifuge and it is assumed that they arranged themselves in the usual way with the vegetal pole outward or centrifugally. About one-third of the eggs which received the proper degree of centrifuging developed abnormally. Controls developed normally in every case.

[9] Beams, J. W., Weed, A. J., and Pickles, E. G., *Science*, 1933, **78**, 338.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We are unable to offer a definite explanation regarding the cause of the doubling of the neural tube and notochord and of the other curious malformations mentioned above. However, they may be due to mechanical disturbances in development caused by a displacement of mitotic figures, by the injury and possible killing of certain cells, or by the intense stratification of materials which results in an upset of the processes of development. On the other hand, it seems equally plausible from the work of Spemann and his collaborators that centrifuging in the many cell and early gastrula stages may have affected the composition or organization of the "inductors" or organizing centers resulting in a disturbance of the normal inductive process.

7607 C

Morphological Comparison of Anterior Pituitaries of Normal Castrated Female Rats and Those Receiving Injections of Pregnancy Urine Extracts.*

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It has been reported by Severinghaus[1] and Wolfe, Ellison and Rosenfeld[2, 3] that while injections of extracts of pregnancy urine result in marked changes in the anterior pituitaries of normal female rats, such extracts are without action on the anterior pituitaries of castrated female rats. In our previous reports[2, 3] detailed data were not given; in this report we wish to present quantitative data which demonstrate that the anterior pituitaries of non-injected castrated female rats (both mature and immature) are morphologically indistinguishable from those of female rats receiving injections of extracts of pregnancy urine.

Sixty-five virgin mature and 31 immature female rats were cas-

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1 Severinghaus, A. E., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 593.

2 Wolfe, J. M., Ellison, E. T., and Rosenfeld, Louis, *Anat. Rec.*, 1934, **58**, 93 (supplement).

3 Wolfe, J. M., Ellison, E. T., and Rosenfeld, Louis, *Anat. Rec.*, 1934, **58**, 94 (supplement).