ficial respiration, and are independent of the rhythm of the respiration. They were missed in control experiments after the death of the animals. The electrothalamogram has also in common with the electrencephalogram that sensory stimuli, such as a pin prick to the foot, may diminish or even abolish the slow waves, while both types of waves persist in the cortical (Bremer[7]) and in the thalamic records, if impulses from the spinal cord and rhombencephalon are cut off by transverse section of the midbrain.

In order to eliminate the influence of corticofugal impulses, the cerebral cortex was exposed, leaving over it only a small bridge of bone with the electrode holder. The lateral surface of the cortex was then destroyed by electrocautery and the thalamic potentials were again recorded. Under these circumstances, the electrothalamogram showed also the 2 types of waves as above described. The inference may be drawn that these waves are due to the activity of the thalamic nuclei. If one considers the electric potentials as an indicator of cellular (neural) activity, the close resemblance of the electrencephalogram and of the electrothalamogram seems therefore to suggest that the activity of the optic thalamus is, at least to a certain degree, of a type similar to that of the cerebral cortex.

8457 P

Foetal Respiration in the Rabbit.

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The occurrence of intrauterine respiratory movements in the foetus has been noted[1-4] but has received scant study.

The use of the method of Snyder[5] to inhibit parturition in rabbits enabled us to make direct observations upon the full term foetus in the unopened uterus. Anesthetization of the abdominal

[7] Bremer, F., *C. R. Soc. belge de biol.*, 1935, **118**, 1235.

[1] Preyer, W., *Specielle Physiologie des Embryo.* Leipzig. Th. Grieben's Verlag, 1885.

[2] Ahlfeld, F., *Monatschr. f. Geburtsh. u. Gynäk.*, 1905, **21**, 143.

[3] Reifferscheid, K., *Deutsche Med.*, 1911, **37i**, 877.

[4] Klemperer, H. H., *Arch. f. Gynäk.*, 1933, **154**, 108.

[5] Snyder, F. F., *Bull. Johns Hopkins Hosp.*, 1934, **54**, 1.

and perineal region was accomplished by section of the lumbar spinal cord under novocain. After partial immersion of the animal in a bath of warm (38°) Ringer's solution, laparotomy was performed, and the foetuses were observed through the transparent wall of the intact uterus. A cannula was inserted under local anesthesia into the mother's trachea to permit administration of various gas mixtures. This report is based upon observations in 30 pregnant rabbits, studied from the 28th to the 34th day of gestation.

Foetuses within the intact uterus exhibit spontaneous respiratory movements characterized by rhythmic excursions of the thorax and abdomen. Although shallower, they resemble qualitatively the respiratory movements observed after birth. There is great variation in respiratory activity among different foetuses in the same uterine horn, some may be quiescent, others respiring at independent rates up to 60 per minute. The rate usually increases during the first half-hour of an experiment and thereafter remains fairly constant. In general respiratory activity increases near term with age of the foetus. Foetuses followed 24 to 48 hours after an experiment were found to develop normally. The above described foetal intrauterine respiration was not initiated by the experimental procedure since careful observations through the unopened abdominal wall revealed its presence within the normal unoperated animal.

A number of anesthetic agents—ether, paraldehyde, sodium phenobarbital, and sodium pentobarbital—given to the mother in amounts that did not impair respiration but merely induced light anesthesia were nevertheless found to depress seriously or even to inhibit completely intrauterine respiration in the foetus. Respiration could be stimulated or initiated in such anesthetized foetuses by clamping the umbilical cord.

Anoxemia induced in the mother by administration of a gas mixture containing 4% oxygen and 5% carbon dioxide in nitrogen produced immediate slowing or cessation of foetal respiratory movements though the maternal respiration was greatly stimulated. Upon replacement of the low oxygen mixture by air foetal respiration usually returned to normal, but prolonged or excessive anoxemia caused permanent impairment. We have obtained no evidence of stimulation or initiation of intrauterine respiration by oxygen want.

Carbon dioxide (5% and 7½% in air and in oxygen) administered to the mother for periods up to 15 minutes failed to influence foetal respiration to a significant degree though an occasional increase in rate was noted. Breathing was not initiated in foetuses

which were quiescent before carbon dioxide administration was begun.

Hyperventilation of the mother with the aid of a respiratory pump resulted in slowing of respiration or complete apnea in the foetus. Upon suspension of artificial respiration the foetuses remained for several minutes in a state of respiratory quiescence but subsequently resumed their original rate.

On the basis of these studies we regard the onset of post-natal respiratory activity not as an event initiated abruptly at birth but rather as a transition from the type of respiratory movement discernible during intrauterine life. Our observations do not lend support to the view of Barcroft[6, 7] that the first breath of a new-born is caused by oxygen want. On the contrary, a diminished supply of oxygen depresses foetal respiration in the rabbit. In agreement with the results of Barcroft the foetus appears to be quite unresponsive to excess of carbon dioxide introduced through the mother. On the other hand a certain minimal carbon dioxide tension seems to be essential for the maintenance of foetal respiratory function.

8458 P

Ineffectiveness of Drugs upon Collateral Coronary Flow.*

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Valid experimental evidence as to whether a drug can improve collateral coronary blood flow to an ischemic area is difficult to obtain. Observation of color changes or comparison of size of infarcts without and with use of a drug are subject to too many contingencies to have a certain value. Observations as to the effects of drugs upon coronary inflow and outflow do not test the response of collateral vessels and ignore the hemodynamic alterations resulting from occlusion of the main branch.

We therefore studied the reliability of 4 other possible criteria of

[6] Barcroft, J., *Lancet*, 1935, **229**, 647.

[7] Barcroft, J., XV Internat. Physiol. Congress, Leningrad-Moscow, 1935, 21.

* This investigation has been made with the assistance of a grant from the Committee on Therapeutic Research, Council on Pharmacy and Chemistry, American Medical Association.