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The Behavior of the Arterioles and Capillaries of the Lung.

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In order to study the pulmonary circulation by direct observation and under physiological conditions, a method has been devised which permits a direct view of the vessels of the lung with the chest closed.

Under amytal anesthesia the chest wall of the cat is so prepared that only a layer of pleura remains to keep the chest wall intact. This window of the pleura is planned so that it will lie directly over the extreme edge of the right lower lobe of the lung, in the axillary line. An abdominal incision is made which allows approach to the diaphragm immediately opposite the window in the outer wall. A similar window is then prepared by dissecting the muscle fibers from the diaphram and leaving the pleural layer intact. By means of this window a beam of light is thrown through the lung at sufficient intensity to permit direct observation of the pulmonary vessels with a microscope at the outer window. By employing this method it has been possible to observe the smaller arteries and veins and the capillaries under various conditions.

In every instance the preparation was made under similar conditions, but the appearance of the lung vessels showed marked variation. In some instances 1 or 2 capillaries were open on the wall of an alveolus, while in others 6 or 8 were open and showed circulation in them.

The diameters of the capillaries also varied greatly. At times one saw a capillary of such diameter that only a single red blood cell could pass through, while on the same alveolus or on an adjoining one, a capillary of twice that diameter could be seen.

Pressure upon the abdominal aorta caused new capillaries to open up, and at times arterioles, hitherto unseen, opened. And, as to be expected, when the pressure was removed from the aorta many of the capillaries and in some instances arterioles closed and blocked the circulation through them.

Thus far changes in the O_2 and CO_2 content of the air breathed by the cat, have not influenced the number of capillaries opening and

closing. Technical difficulties with the method have also delayed the report of results of the effect of adrenalin, pituitrin, nitrates and other drugs, but these studies are now under way.

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Decerebrate Preparation (maternal) for Direct Observation of Unanesthetized Mammalian Embryo.

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In order to study the living mammalian embryo with placental circulation intact and without the disturbing effects of anesthesia, we have made decerebrate preparations of pregnant rabbits under light ether anesthesia. After transecting the thoracic cord to prevent undue reflex movements of hind limbs, anesthesia is discontinued. The uterus exposed by abdominal incision, is opened by longitudinal incision in the relatively avascular region, opposite to the placental attachment. Embryo in transparent amniotic sac is extruded by the contracting uterus, but placental attachment is usually not disturbed. Amniotic sac may now be opened. The embryo is kept moist and warm by a constant drip of warm Ringer's solution. Great care must be used not to place the umbilical cord under tension. A camel's hair brush is useful for manipulation. Such preparations kept moist and warm may be continuously observed for at least two hours and probably longer. Even after the placenta was completely separated from the uterus, some of our small rabbit embryos (9-25 mm. crown-rump length) have survived more than an hour. We believe such preparations will be useful for a variety of studies.

The smaller embryos, up to 13 mm. crown-rump length, are almost completely transparent except for liver and heart, and are particularly suited for transillumination (the heart beat, easily visible to the naked eye, was 50 to 60 per minute in three preparations). For this purpose the embryo with placental circulation intact is placed directly upon the substage condenser of a binocular microscope and transilluminated from below. (It was found convenient to mount the microscope, disconnected from the condenser, on an adjustable stand.)

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