

we turn to a summary of the experimental and clinical investigation of transfusion, and will first consider the experimental.

*Experimental.*—We first investigated the effect upon the blood transferred and the blood and tissue of the recipient in a transfusion from a normal individual of a species to another. One normal animal was bled to the limits of safety and an equal amount of blood transfused from another. After two weeks the experiment was reversed, the blood from the recipient being transferred to the first donor. A third animal was then used as a donor and the same experiment performed. After two weeks this was reversed. In repeating the bleeding and transfusion, re-transfusion and a second transfusion, then introducing the blood of a third animal, no ill effect was noted. The dogs remained in normal health. The transfusion of a number of animals without previous bleeding proved likewise harmless. Complete metabolism observations made by Prof. Haskins of Western Reserve, and Prof. Folin of Yale, did not show any changes of consequence. Likewise a complete metabolism determination in a clinical case was negative. Many microscopical observations of the blood picture of the recipient were negative as to any abnormal changes. No hæmoglobin was found in the urine. We, therefore, reached the conclusion that the blood of one normal animal is physiologically interchangeable with that of another of the same species.

We next investigated the effect of an over-transfusion, utilizing a very large dog as the donor and a very small one as the recipient. As a result of these experiments we found that if transferred rapidly, a full head stream from the carotid artery of the donor into the jugular vein of the recipient, an œdema of the lungs in some instances soon followed. In one experiment within four minutes after opening the flood gate of blood from the large dog, froth and serum rapidly poured out of the nose and mouth of the recipient. On the other hand, when the over-transfusion was done more slowly so as not to embarrass the right heart and the pulmonary circulation, utilizing a huge donor and diminutive recipient, the blood was successfully transferred from the pulmonary to the systemic circulation, the abdomen in time became enlarged and gradually increased until it became so tense that the diaphragm and the movable ribs were immobilized and the animal died of asphyxia.

After studying various grades of over-transfusion of this class, it was found that first there was a filling up of the tissue of the liver, the spleen, and other abdominal viscera. This was soon followed by the transudation of an amber-colored fluid, later tinged with blood, finally bloody. This bloody fluid and the hard, swollen liver and spleen, and the engorged and thickened stomach and intestines, finally so distended