flow of blood. The blood of a heparinized animal is allowed to flow from the proximal end of an artery through a glass tube about 15 cm long, returning to the circulation by way of the distal end of the same artery. This tube is surrounded by a water-jacket conducting water at a constant rate of flow. The water supplied at a constant temperature by a well-insulated Mariotte bottle is heated as it passes up the water-jacket in contact with the central tube. The water-jacket is in turn insulated against loss of heat to the exterior. By placing the cold junctions of a multiple thermopile in the course of the water inflow and the hot junctions in the course of the water outflow the degree of heating of the water which varies with the flow of blood can be followed. A continuous record of changes in blood flow in terms of E.M.F. is made on smoked paper by registering the movement of the drum of a Leeds and Northrup type K potentiometer required to keep the galvanometer at zero.

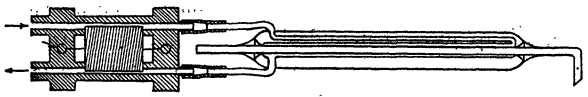

FIG. 1

The improvement of the thermopile vessel consists in substituting glass for bakelite. This construction eliminates several of the difficulties of the bakelite construction. Air bubbles in the water-line are visible and may thus be removed, and water leaks which were hard to avoid are eliminated. The outer insulating chamber is exhausted with the vacuum pump.

ROBERT GESELL

UNIVERSITY OF MICHIGAN

AN ENCLOSED DROP METHOD OF RECORDING VOLUME FLOW OF FLUIDS BY OIL DISPLACEMENT

THE method was devised primarily for following the volume flow of blood. The principle, however, may be applied for the registration of other flows as well.

The vein of a well-heparinized animal is prepared for insertion of two cannulas. The peripheral cannula is of the ordinary simple type. The central cannula is enlarged and shaped as shown in the figure. It is filled about half and half with isotonic salt solution and liquid paraffin and stoppered to the exclusion of air. The blood from the peripheral cannula is conducted into the central cannula through a glass tube which protrudes into the oil. As the blood flows it collects on the end of this tube in a large drop suspended in the supernatant oil displacing the salt solution below. The drop eventually falls and mixes with the saline and is in turn displaced into the circulation.

The flow may be recorded manually by signal or automatically by electrolytic contact as the drop falls between two sharply pointed electrodes. For electrical registration we have used a 2000-ohm telegraph relay (supplied by the J. H. Bunnell Company, 32 Park Place, New York) operating an ordinary signal magnet. Other simple methods of automatic registration may be used.

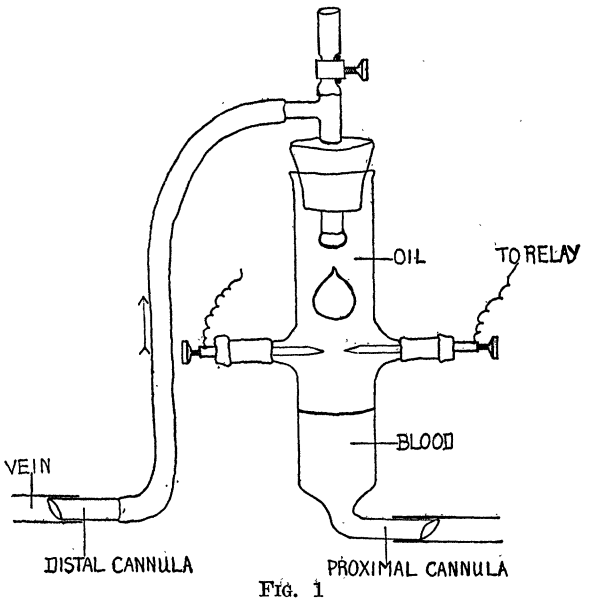

FIG. 1

The enclosed drop method of studying the flow of blood has the advantage of avoiding loss of blood and of automatically returning the blood to the circulation. Due to the buoying force of oil the drops are very large. It is thus possible to apply the drop method to relatively rapid flows.

ROBERT GESELL

UNIVERSITY OF MICHIGAN

SPECIAL ARTICLES

LOVELAND LOESS: PRE-ILLINOIAN, PRE-IOWAN IN AGE[1]

THE interpretation presented by Professor G. F. Kay in the November 16, 1928, issue of SCIENCE, that the Loveland loess is post-Illinoian, seems to be based on rather slender and inconclusive evidence. This being the case, the deduction drawn, that the Iowan falls in a separate glacial stage from the Illinoian, should be taken as tentative rather than final.

The present writer agrees with Kay as opposed to Shimek that the Loveland formation is not a fluvioglacial deposit of Kansan age, but is of much later date, and laid down on the eroded surface of the Kan-

[1] Published by permission of the director, U. S. Geological Survey.