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.

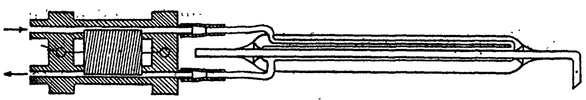

Fig. 1

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.

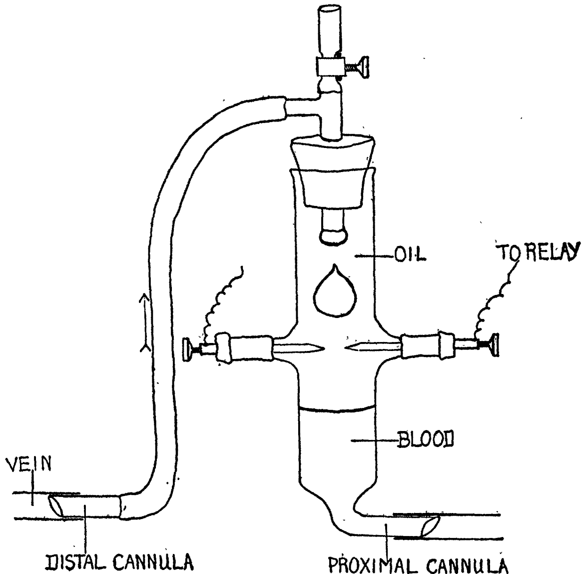

Fig. 1

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 fluvio-glacial 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.

san drift. It also seems to be mainly a wind deposit, classifiable as loess. He has also visited with Kay exposures of loess on an eroded Kansan drift surface under the Iowan drift of northwestern Iowa, and with him regards this loess as a probable correlative or continuation of the Loveland loess. We are thus in agreement that the Loveland loess is probably pre-Iowan.

The relation of the Loveland loess to the Illinoian drift does not seem to be so easy a matter to determine. There is a loess on an eroded Kansan drift surface beneath the Illinoian drift on the borders of the Mississippi valley to which the writer called attention some thirty years ago.[2] Its fossils were identified by W. H. Dall as of species similar to those found in the surface loess of that region, there described as Iowan loess. The aspect of the deposit is very similar to that of the so-called Iowan loess, though it is more indurated and distinctly older in appearance. In outcrop it bears a striking resemblance to the Loveland loess. This loess thus stands as a possible if not a probable correlative of the Loveland loess, both being down on an eroded Kansan drift surface. This carries with it reference of the Illinoian as well as Iowan drift to a post-Loveland stage.

In general the Illinoian drift is overlain by a single loess deposit which was called Iowan loess, because at the time the name was applied it was supposed to be closely related to the Iowan drift. This loess overlies the Sangamon soil and Illinoian gumbotil, forming the weathered surface of the Illinoian drift. It is now generally held that this loess is an interglacial deposit, for the molluscan fossils in it are of temperate climate species similar to the mollusks inhabiting the region. Its stratigraphic position is between the Sangamon soil and the early Wisconsin drift. It appears to have antedated that drift by only a short period of weathering, to which the name Peorian has been applied. It still stands in the position originally assigned to it, and it is a question whether it should not still carry the name Iowan loess pending the settlement of the place of Iowan glaciation in the Pleistocene chronology. Attempt has been made by some writers to name this loess Peorian, though that name was given to the interval of weathering following its deposition.

Beneath the Iowan loess there are a few places in which silt deposits, which in places simulate loess, occur in close association with the Sangamon soil and Illinoian gumbotil. These deposits are generally not as homogeneous as loess and are probably only in part wind deposits. Kay refers to deposits of this sort at the Farm Creek section, east of Peoria, discussed by Leighton in the *Journal of Geology,* in 1926, and considers them the equivalent of the Loveland loess. The description given by Leighton will serve to show the variable character of this deposit within a space of 225 feet, the length of the exposure:[3]

Loess-like silt; on east side brownish in upper 1–1½ feet, grading below into grayish-yellow 2–2½ feet, and again into brownish with carbon specks, 3–4 feet, the lower two feet showing slight trace of effervescence with acid; no effervescence in upper 5½ feet; no bedding or stratification. On west side this loess-like silt is bluish-gray with greenish cast below the old soil, the soil and about six inches of the greenish loess is leached; calcareous below, very compact, no bedding or stratification, scattered small pebbles in lower three feet; thickness same on both sides of cut, 7–8 feet.

It appears that Professor Kay, in his attempt to settle the question of the relative ages of the Illinoian and Iowan drifts, is using nondescript deposits of this sort on the Illinoian drift as representative of the Loveland, while overlooking the more characteristic deposit of loess that underlies the Illinoian drift.

In case the loess below the Illinoian drift proves to be of Loveland age, there would be a very slender basis for referring the Illinoian and Iowan drifts to distinct glacial stages.

FRANK LEVERETT

ANN ARBOR, MICHIGAN

[2] "The Illinois Glacial Lobe," U. S. Geol. Survey Mon. 38, pp. 114–115, 1899.

[3] *Journal of Geology,* 34: 169, 1926.

ON THE ROTATORY POWER OF SERUM

WE have shown recently[1] that the viscosity of normal serum presented an absolute minimum value at a temperature near 56° C. The existence of this minimum is of particular interest inasmuch as it occurs at a temperature which is known to be of great importance biologically. Assuming that the physicochemical change in the serum (modified dispersion, birth and growth of micellae, fixation of water molecules) which resulted in an increased viscosity as soon as the turning-point (56°–57°) was reached, had an underlying cause of purely chemical nature, we have tried to prove its existence by measuring the rotatory power of the serum at all temperatures up to 70° C. and after heating for various lengths of time. The purpose of this short paper is to summarize the results obtained.

(1) There is no temperature coefficient for the levo-rotatory power of the serum, up to 55° C., for rapid heating. Mean values are, for a tube 10 cm long (normal horse serum), $-4°.16$ (green line of the mercury arc); $-3°.61$ (yellow lines); $-2°.95$ (red line). The mean specific rotatory power being: $-58°$ (green line); $-49°$ (yellow line); $-40°$ (red line).

[1] *J. of Gen. Phys.,* 12: 363. 1929.