A MODIFICATION OF VAN LEERSUM'S BLOODLESS METHOD FOR RECORDING BLOOD PRESSURES IN ANIMALS.

By ALFRED E. COHN, M.D., and ROBERT L. LEVY, M.D.

(From the Hospital of The Rockefeller Institute for Medical Research.)

PLATES 25 TO 28.

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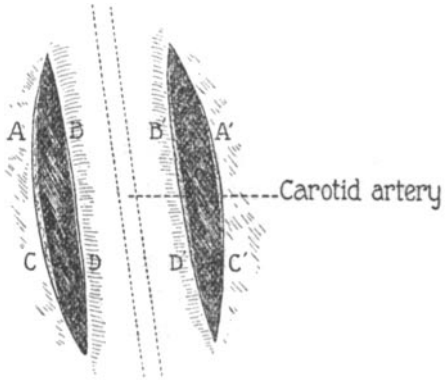
A satisfactory method does not exist for taking the blood pressure in laboratory animals so that observations can be repeated on successive days over long periods of time. The advantages of possessing such a method are obvious. A single animal may behave differently on different occasions; it may react differently to different members of the same group of agents. A method such as the one described in this communication affords an opportunity for ascertaining the usual behavior of an animal.

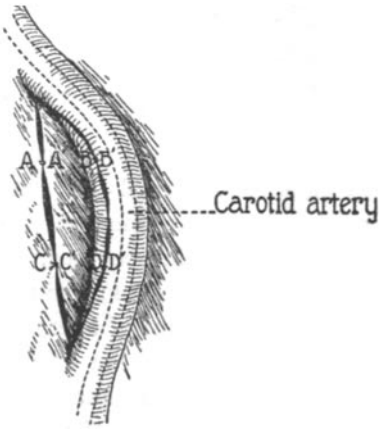
The essential part of the method was described in 1911 by Van Leersum[1] and was utilized by him for studies on rabbits. It consists in making the carotid artery accessible to direct examination. In order to do this an aseptic operation under ether anesthesia is performed. Two longitudinal and parallel incisions are made in the neck of the animals (dogs were utilized by us) about 7 to 10 cm. long (Text-fig. 1), the distance between the two being about 3 to 4 cm. The stretch of skin between the two incisions is freed from the underlying muscle. As much of the subcutaneous tissues is permitted to remain attached to the skin as will insure to it a sufficient blood supply. The carotid artery is then found and gently freed of the other structures contained in the carotid sheath; when possible a generous amount of areolar tissue is permitted to continue to surround the artery. The length of the artery freed in this manner should be

[1] Van Leersum, E. C., Eine Methode zur Erleichterung der Blutdruckmessung bei Tieren, *Arch. ges. Physiol.*, 1911, cxlii, 377.

several centimeters longer than the skin incisions. The edges (Text-fig. 2) of the stretch of skin are next sewed together so that the skin surrounds the artery as a tube. The outer edges of the two incisions are then approximated and sutured to restore the skin of the neck. The adjustment of the edges at the two ends of the tube and of the skin of the neck must be exact. The ligature material may be silk, but we have found retaining sutures of chromic gut and intervening



TEXT-FIG. 1.



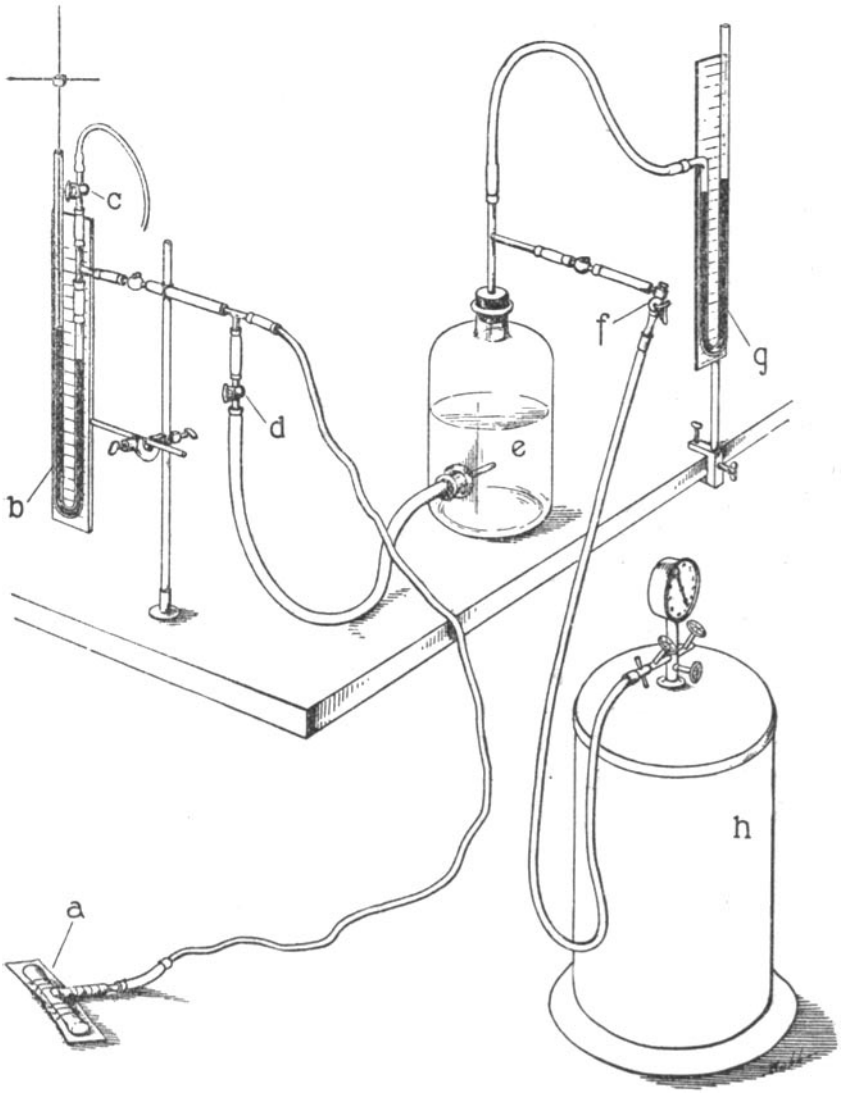
TEXT-FIG. 2.

TEXT-FIG. 1. Two vertical and parallel incisions in the neck are shown. The position of the carotid artery in respect to the stretch of skin between them is indicated.

TEXT-FIG. 2. The formation of the tube of skin containing the carotid artery is shown. After freeing the artery from the carotid sheath it is lifted out and surrounded by the stretch of skin between the incisions shown in Text-fig. 1. The operation is completed by suturing the points *BB'*, *DD'* and *AA'*, *CC'*.

sutures of plain gut more satisfactory. A dry dressing is interposed between the carotid tube and the repaired neck. The wound is dressed with dry gauze and the bandage is held in place with adhesive plaster. The wound may be dressed after an interval of 4 to 6 days. The sutures are removed when sufficient healing has taken place. The wound should heal by primary intention (Fig. 1).

The carotid artery surrounded by its tube of skin is now accessible to examination. In the technique employed by Van Leersum it is



TEXT-FIG. 3. Diagram of the cuff system. *a*, the cuff for surrounding the carotid tube. *b*, mercury manometer and writing point. *c*, valve permitting escape of pressure from the system. *d*, valve for elevating pressure within the system. *e*, water bottle kept at a pressure of about 250 mm. of mercury (*g*). *f*, escape valve. *h*, air pressure tank to supply pressure for *e*.

surrounded by a rubber cuff designed like that of von Recklinghausen but of smaller dimensions, 1 or 2 cm. wide by 3 or 4 cm. long. The pressure in the cuff is elevated until pulsation is no longer felt in the artery distal to the cuff. This pressure is read on a mercury manometer.

We have introduced a graphic method of recording pressure. The system between cuff and manometer is filled with water (Text-fig. 3). Except where it was impossible, we have used lead tubing. Pressure is introduced through a cock (*d*) into the system from a bottle kept at a pressure of about 250 mm. of mercury. It is allowed to escape through a stop-cock (*c*) at the proximal limb of the manometer.

By means of these cocks pressure can be elevated or can be permitted to fall either stepwise (Fig. 2) or gradually (Figs. 3 and 4). The record is made on smoked paper by a writing point supported on a float on the mercury column. The base-line is inscribed. Minimum and maximum oscillations utilized by Erlanger as the points of maximum and minimum pressures may be utilized.[2] We have obtained deflections of sufficient size to permit us to make accurate observations. If it is desirable, it is possible to train dogs to lie quite still for an hour or more without anesthesia or narcotics. To be able to do this has obvious advantages.

We are now making use of the method for the study of drugs of the digitalis series in which we desire to obtain simultaneous blood pressure records and electrocardiograms. The results of these studies will be given in another communication.

[2] To avoid the oscillations due to the shock of the impinging blood stream on the cuff, a second cuff distal to the first may be introduced about the carotid tube. The pressure of this cuff is maintained at the diastolic level. Only when the pressure in the artery is high enough to pass the proximal cuff, will the distal one be affected and a record be inscribed.

EXPLANATION OF PLATES.

PLATE 25.

FIG. 1. The carotid tube of one of the dogs after recovery.

PLATE 26.

FIG. 2. Below is the base-line. The blood pressure is inscribed by the method of intermittent escape of pressure. The systolic pressure is recorded at the step below the top (202 mm. of mercury); diastolic pressure at 100 mm.

PLATE 27.

FIG. 3. Record of blood pressure taken by the method of gradual escape. The systolic pressure is 154 mm. of mercury; the diastolic pressure is 88 mm. The top line is a signal to indicate when an electrocardiogram was made. The bottom is the base-line.

PLATE 28.

FIG. 4. Record of blood pressure taken by the method of gradual increase of pressure. The systolic pressure is 160 mm. of mercury; the diastolic pressure is 88 mm. The top line is a signal to indicate when an electrocardiogram was made. The bottom is the base-line.

FIG. 1.

(Cohn and Levy: Blood pressure in animals.)

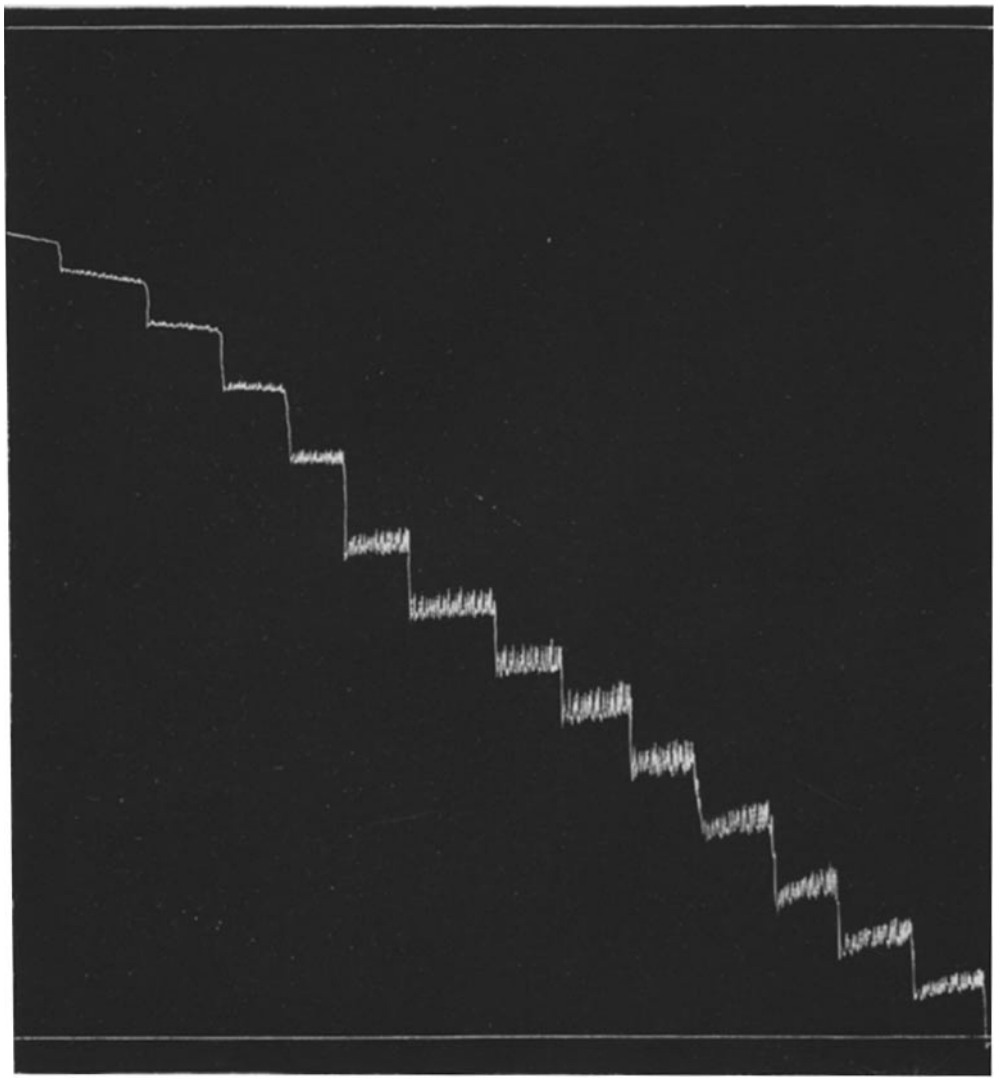


FIG. 2.

(Cohn and Levy: Blood pressure in animals.)

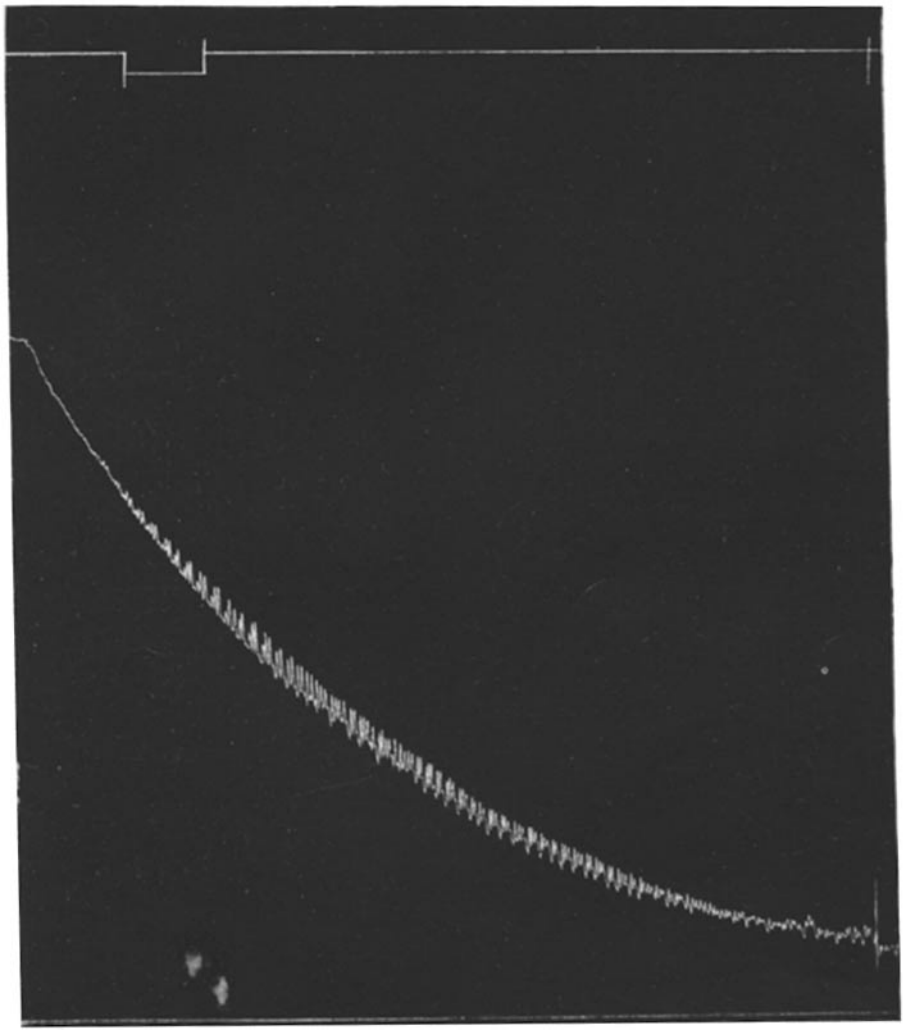


FIG. 3.

(Cohn and Levy: Blood pressure in animals.)

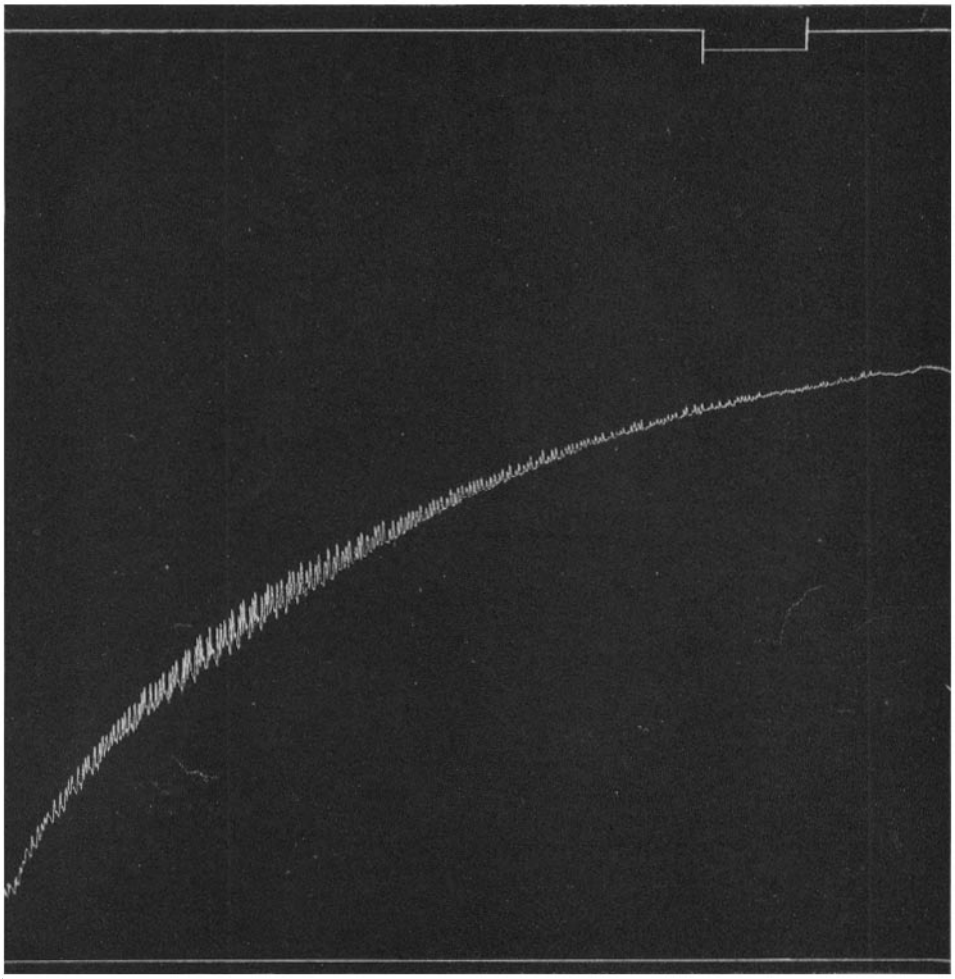


FIG. 4.

(Cohn and Levy: Blood pressure in animals.)