Bedford, *General Science*, p. 310 and following.
Hessler, *First Year of Science*, p. 258 and 312.
Elhuff, *General Science*, p. 305–334, 393, 407.
Gruenberg, *Elementary Biology*, p. 437, 274–335.
Hunter, *Civic Biology*, p. 191–196, 249, 404–406.
Moon, *Biology for Beginners*, p. 316–341.
Gager, *Fundamentals of Botany*, p. 502.
Jordan, Kellogg & Heath, *Animal Studies*, p. 417–448.
Linville & Kelly, *Text-book in General Zoology*, p. 99–115, 292, 434 to end of book.
Eddy, *General Physiology and Anatomy*, p. 38, 218, 219.
Norton, *Elements of Geology*, p. 291, 443 to end.
Young, *Lessons in Astronomy*, p. 348–358.

In response to the opportunity afforded by the Board of Education to all parties present at the hearing conducted by the board on August 4, 1924, and to all others interested, briefs on the subject of evolution, with special reference to the teaching of that subject in state-supported schools, were presented by

Rev. T. Hector Dodd, San Rafael.
Rev. Harry Gill, Sacramento.
Rev. Clarence Reed, Oakland.
Rev. George L. Thorpe, Corona.
Rev. E. E. Wall, Sacramento.

The members of the Committee of Nine have examined and considered those pages and sections of the twelve text-books to which their attention has been specifically directed, and likewise the five briefs. The committee respectfully submits the following report:

The theory of evolution, in one or another of its phases, is referred to in these books—it could scarcely be omitted from any text-book on biology, or astronomy, or geology—and in a few of the books some of the evidence in support of the theory of evolution is presented. In our opinion, these books have treated the subject with moderation and circumspection. There appear to be no statements derogatory to the Bible, and in the few instances in which the possible bearing of evolution upon religion is discussed at all, the writers have taken special pains to assure the readers that there is no conflict between science and religion. Evolution is presented as a theory, and not as an established fact, although it is stated here and there that the theory of evolution is commonly accepted by scientific men, and that is true. On this phase of the subject the following quotations have bearing:

A. Moon's Biology for Beginners, pp. 329–331: "Some Things that Evolution does *Not* Teach. . . . 'That man is descended from a monkey.' That God can be left out of the scheme of Creation. . . . While we can not go into the argument here, rest assured that in the minds of the greatest scientists and philosophers there is no conflict between the conclusions of Science and Religion. To quote Davenport, 'The Creator is still at work, and not only the forces of Nature, but man himself, works with God in still further improving the earth and the living things which it supports.' "

B. Gager's *Fundamentals of Botany*, pp. 516 and 517. "The publication of Darwin's *Origin of Species* aroused at once a storm of opposition. Theologians opposed the theory because they thought it eliminated God. . . . The unthinking and the careless thinkers accused Darwin of teaching that man is descended from monkeys. Neither of these accusations, however, was true. Darwinism neither eliminates God, nor does it teach that monkeys are the ancestors of men.

"By slow degrees, however, men began to give more careful and unprejudiced attention to the new theory, and not to pass adverse judgment upon it until they were sure they understood it. 'A celebrated author and divine has written to me,' says Darwin, 'that he has gradually learnt to see that it is just as noble a conception of the Deity to believe that He created a few original forms capable of self-development into other and needful forms, as to believe that He required a fresh act of creation to supply the voids caused by the action of His laws.' "

The text-books before us are concerned with presenting scientific facts and theories of which every person with any pretense to an education in the subject or subjects treated should be informed. All departures of the authors from this simple policy may be said to show due respect and consideration for the fundamental principles of religion, as presented in the Bible.

(Signed) W. W. CAMPBELL (Chairman)
President of the University of California
RAY LYMAN WILBUR
President of Stanford University
AURELIA HENRY REINHARDT
President of Mills College
KARL T. WAUGH (acting for President R. B. von KleinSmid)
University of Southern California
REMSEN D. BIRD
President of Occidental College
JAMES A. BLAISDELL
President of Pomona College
V. L. DUKE
President of University of Redlands
TULLY C. KNOLES
President College of the Pacific
CATHERINE O'DONNELL
President of Dominican College

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE MEMBRANE MANOMETER

THE introduction of a cannula into the carotid arteries of small animals like the rabbit, guinea pig and rat is at least for impracticed hands a matter of considerable difficulty; and on account of the delicacy of the vessel wall, the small arterial pulsation and the ease with which clotting sets in, the results are often unsatisfactory. The abdominal aorta of these animals, however, is easily reached, its lumen is much larger, its walls are thicker and the pulsations are much larger, so that the use of this vessel is very satisfactory for the taking of routine blood pressure records by students.

The abdominal aorta is easily reached through a very long incision which is made in the abdominal wall as far to the left as possible and extending from the costal margin to the level of the pubis. A wide retractor made of a piece of tin, wide enough to fit in the incision and bent at right angles near the end, is used to retract the intestines as far as possible to the left. (Fig. 1.) This keeps the intestines entirely within the abdomen and preserves them from exposure, and at the same time it exposes the aorta.

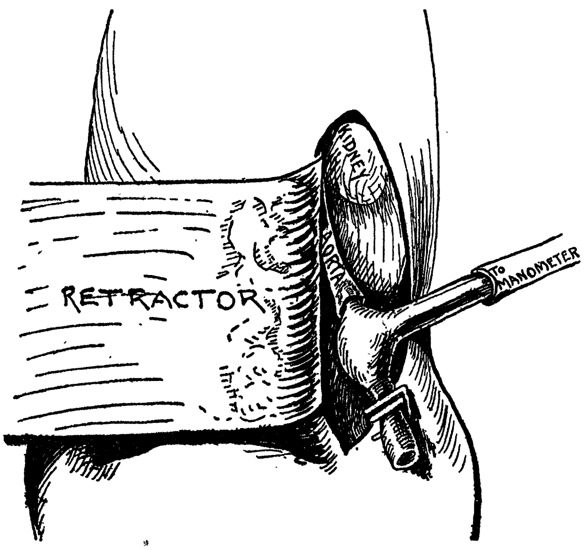

FIG. 1. Introduction of cannula into the abdominal aorta.

The aorta is dissected free as low as possible. The distal portion is ligated off above the bifurcation of the iliac arteries; the upper end is clamped off with a long-jawed bulldog clamp, a ligature is thrown around it and a bulbed T cannula is inserted into the aorta in the usual manner. The cannula is then filled with saturated Na_2CO_3, $MgSO_4$ or 5 per cent. sodium citrate solution and connected with a mercury manometer in the usual manner.

After this has been done the retractor is removed and the incision in the abdominal wall is held closed by a series of haemestats.

In this way large pulsations 2 to 3 mm in amplitude are easily obtained from the abdominal aorta of a rabbit and pulsations of 4 to 5 mm from the abdominal aorta of a cat. (Fig. 2.)

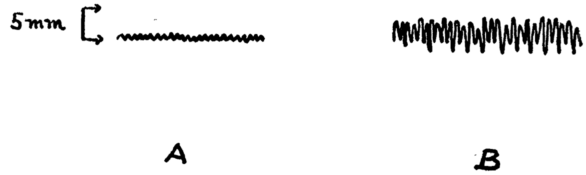

FIG. 2. Showing the records obtained with a mercury manometer from (A) the carotid artery and (B) the abdominal aorta of a cat.

The operation is easily carried out by students and well suited for class work.

Where large pulsations are desired for the study of the pulse rate and rhythm, as for study in the effect of digitalis on auricular fibrillation, we have made use of a modification of the Huerthle membrane manometer, which is very cheaply and easily constructed from materials which are at hand in any laboratory.

Two oblong pieces of brass plate are selected and near each of the four corners a hole to fit a small machine screw is drilled and threaded, so that the two plates can be screwed tightly together. (Fig. 3.) A hole one centimeter in diameter is drilled through the

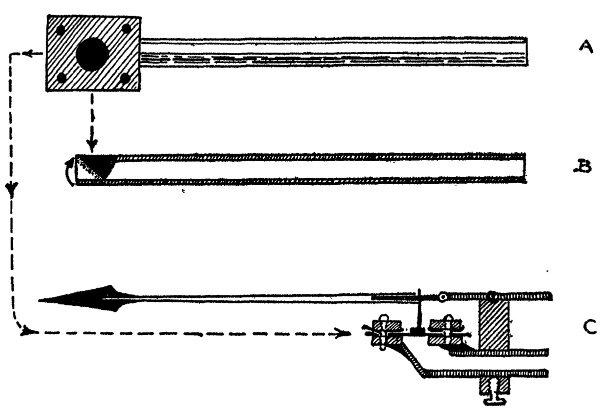

FIG. 3. Construction of a Simple Membrane Manometer.
A. View of manometer (exclusive of writing lever) from above.
B. Sagittal section of tube, showing lines for excision of the segment.
C. Lateral view of the completed apparatus.

center of the plate. The lumen of this hole forms the lumen of the tambour. The well of the tambour is completed by sawing a V-shaped wedge from near the end of a piece of 3/8 in. (10 mm.) brass tubing about 20 m long. The lip formed by the removal of the wedge is bent upwards to form a \— shaped end; and this is soldered to the lower surface of the lower plate in such a way that the beveled end of the brass tubing forms the well of the tambour, while the long brass tube forms the shaft. The membrane is supplied by a piece of thin rubber dam screwed tightly between the two brass plates. If necessary, a second thickness of rubber dam, with a 1 cm hole pushed through its center by a cork borer may be used as a gasket. A light muscle lever, resting on the dam by means of a small round foot of sheet aluminum, transmits the pulsation to the lever. A light hollow straw bearing a writing tip of celluloid camera film furnishes the best lever.

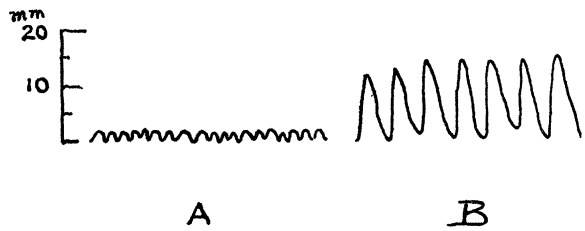

FIG. 4. Mercury manometer tracing (A) and membrane manometer tracing (B) from the abdominal aorta of a rabbit.

The tambour is filled with the anticoagulant solutions by means of a long capillary pipette, inserted through the shaft into the well of the tambour so as to drive out air bubbles.

With such a tambour pulsations 15 mm in amplitude can be obtained from the rabbit's aorta.

SUMMARY AND CONCLUSIONS

The abdominal aorta of small mammals is easy of access, and this vessel is well suited for the taking of blood pressure tracings having a good amplitude of pulsation.

The construction of a very simply made and satisfactory membrane manometer is described with which tracings of very large pulse amplitude are easily obtained.

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SPECIAL ARTICLES

TREE TRUNKS, GROWTH AND REVERSIBLE VARIATIONS IN CIRCUMFERENCE

THE forester bases his conclusions as to growth or production of lumber upon gross measurements compiled from hundreds of trees and is so impressed with individual differences, and with the varying effects of the seasons, that he has but little interest in the changes of the tree from day to day, or, in brief, with its behavior from a physiological viewpoint.

If the production of cellulose, etc., be considered as one of the main interests in forestry, it is obvious that methods similar to those used in the culture and growth of cotton, corn, wheat or flax may be expected to yield results as valuable to forestry as those obtained by making use of the technical results of experimental studies of these great staples.

The botanist, interested in trees as a type of vegetation in which photosynthesis, accumulation of nutritives, conduction of sap and translocation of material and transpiration are carried on in such manner as to afford unexcelled opportunities for study of fundamental problems, has begun to apply exact methods of measurement of the rate, seasonal course and amount of growth in trunks, and to identify the effects of temperature, soil-moisture and other features of the substratum, relative humidity, light intensity, length of season, age, developmental condition, defoliation and other injuries on the activity of growing points and cambial layers.

The size of a tree is an advantageous feature in experimentative manipulation. On the other hand, this massiveness and the term of years requisite for maturity makes it impossible for the geneticist and the physiologist to include hundreds or thousands of individuals in a series, as may be done with corn, wheat or peas. The best procedure is obviously one in which the student, in adherence to a carefully considered program, carries his observations over a term of years on a number of individuals large enough to comprise all developmental stages.

It is in accordance with such a plan that my own studies of tree-growth with the dendrograph include a few seasons' records of trees in about a dozen genera, with attention chiefly concentrated on the Monterey pine (*Pinus radiata*) and the coast redwood (*Sequoia sempervirens*) with an accumulation of continuous records for a total of more than a century, about half of which is of the Monterey pine and including fifteen seasons of redwood.

Of the 29 Monterey pines under observation, the changes in the basal part of tree No. 1 have been recorded for six and one half years, a dendrograph has been attached to its trunk 27 feet from the base since January, 1920, and a similar record of a large root was begun in 1922.

Professor Hirokichi Nakashima has recently published the results of an attempt to find a mathematical expression for growth by a study of a five-year record of a single tree of *Abies Mayriana* in the Botanical Garden at Sapporo, Japan. A Friedrich's Zuwachsautograph was attached to a stem of this Japanese fir, which was about 24.98 mm in diameter at the beginning, and 25.68 mm at the close of the observations. Soil-temperatures and meteorological observations were made in the usual manner. The essential part of the growth-recorder