FISKE FUND PRIZE ESSAY. NO. LVI. THE VALUE OF BLOOD PRESSURE IN THE DIAGNOSIS AND PROGNOSIS OF DISEASE

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THE VALUE OF BLOOD PRESSURE

IN THE

DIAGNOSIS AND PROGNOSIS

OF DISEASE.

MOTTO:
"AGRARIUS."

BY

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1916.

THE Trustees of the Fiske Fund, at the annual meeting of the Rhode Island Medical Society, held at Providence, June 1, 1916, announced that they had awarded a premium of two hundred dollars to an essay on "The Value of Blood Pressure in the Diagnosis and Prognosis of Disease," bearing the motto:

"Agrarius."

The author was found to be DR. ALLEN G. RICE, of Springfield, Mass.

The Value of Blood Pressure in the Diagnosis and Prognosis of Disease.

Nearly two hundred years ago an English clergyman, Stephen Hales, fastened a long glass tube inside the artery of a horse and made quantitative estimates of blood pressure. Although it is now apparent that his results, published in 1733, mark the most noteworthy contribution to knowledge of the circulation after Harvey's classical essay, Hales' work attracted in the eighteenth century little more than academic attention. It seemed indeed of slight practical value and found little favor with either clinicians or physiologists. For nearly a century the clergyman's clear account of his labors lay forgotten in dusty archives, and the subject of his discourse languished. In 1828, Jean-Leonard-Marie Poiseuille, starting with Hales' original blood pressure experiment, improved the apparatus by substituting for the inconvenient long tube a mercury manometer, Poiseuille's hemodynamometer. To this instrument Carl Ludwig, in 1847, added a float which caused graphic records to be inscribed on a revolving cylinder. With these two advances the study of blood pressure became a definite part of experimental medicine. Although notable contributions were from time to time added to the science by Volkmann, Marey, Martin, and many others, it remained for

Ritter von Basch of Vienna, in 1876, to perfect an instrument at all suitable for clinical purposes. Owing, however, to the great difficulty of accurately adapting his small round pelotte to the arm in order to compress the radial artery, the instrument of von Basch and the somewhat improved one of Potain failed to acquire wide usage. Finally, in 1896, almost simultaneously, Riva-Rocci and Hill, working independently, hit upon the one practical device needed to bring the sphygmomanometer into every-day use. A rubber bag or tube encircling the arm and inflated by a bulb or pump took the place of the impractical pelotte heretofore employed. Since 1896, the apparatus has been perfected and the technique simplified; and while changes have been made directed towards portability, means of obtaining circular compression, and source of pressure, there has been no change of moment in the principles of sphygmomanometry.

Long before the advent of an instrument of precision, however, careful clinicians had for generations studied pulse tension and had paid due attention to findings elicited by the palpating finger. While the quantitative estimation of intra-arterial pressure could not be determined by tactile sense alone, alert physicians had, nevertheless, always been able to draw therefrom conclusions of no little clinical importance. Yet, however skilful their touch, they were constantly beset with uncertainties, finding it, for instance, frequently impossible to distinguish by palpation alone between a sclerosed artery and a plus tension. That such unavoidable sources of error gave rise to misconceptions and to a false sense of security, the sphygmomanometer has grimly disclosed. Yet such was the acumen of past masters of the science of medicine that much of the causes and nature of blood pressure were long ago pretty well understood. The sphygmomanometer has in many instances but confirmed empirical facts and given them a sound scientific basis.

The cells of the body are nourished and relieved of waste through the walls of the capillaries. For the efficient activity of the cells these processes must be uninterrupted. It is in order, therefore, to force blood in a continuous stream through the capillaries that all other functions of the circulatory apparatus exist. The chief agent for this purpose is blood pressure, the essential factor in sustaining the circulation and maintaining cardiac activity. Purely from the standpoint of physics tension in the blood stream is brought about by the energy of the heart, by the peripheral resistance against blood flow of the constantly narrowing arterial tree, and to a minor degree by the volume and viscosity of the blood itself. The pressure once established is maintained by the natural elasticity and contractility of the arterial walls. If the arteries were rigid, unyielding tubes, each increment of blood from the heart would be required to move all the blood in the whole system, while during diastole all flow would cease; but, being soft and distensible, the arteries expand under pressure to accommodate more fluid, and during diastole their elasticity and contractility act to uphold pressure.