appointed president of Connecticut Agricultural College at Storrs. Dr. Works will take up his work on July 1. Professor Charles B. Gentry, acting president of the college since the retirement of Dr. Charles L. Beach in July, 1928, will remain as a member of the faculty.

DR. WILBUR WILLIS SWINGLE, director of the department of zoology at the University of Iowa, has been appointed professor in the department of biology at Princeton University.

DR. JOHN SHAW BOYCE, who for fifteen years has been connected with the office of forest pathology of the Bureau of Plant Industry of the U. S. Department of Agriculture, has been appointed professor of forest pathology at Yale University. Dr. Henry Barnard Davis has been promoted to a professorship of geology.

PROFESSOR WILLIAM M. COBLEIGH, head of the department of chemistry and chemical engineering at Montana State College and a member of the staff since 1894, has been appointed dean of the college of engineering and professor of chemical engineering. The appointment is effective on July 1. Professor Cobleigh succeeds Dean Earle B. Norris, who resigned last year to become dean of engineering at Virginia Polytechnic Institute, Blacksburg, Virginia.

DR. FRANK R. MENNE has been appointed head of the department of pathology in the University of Oregon Medical School. He succeeds Dr. Robert L. Benson, who recently resigned.

PROFESSOR B. SMITH HOPKINS, of the University of Illinois, known for his discovery of illinium and work in the rare earths, will be the visiting professor in the department of chemistry of Western Reserve University for the forthcoming summer session from June 24 to August 2. Professor Hopkins will give two series of lectures, one on the "Inorganic Chemistry of the Less Familiar Elements and Their Relation in the Periodic System," and a second course on "The Teaching of Chemistry."

DR. E. H. JOHNSON, head of the department of physics in Kenyon College, Gambier, Ohio, will give lecture courses in the history of physics and thermodynamics at Indiana University during the coming summer session.

DR. H. RAISTRICK has been appointed to the university chair of biochemistry at the school of hygiene and tropical medicine of the University of London.

DR. NOVOA SANTOS, who has been a teacher of general pathology in the University of Galicia, has been appointed professor of the same subject in Central University, Madrid.

## DISCUSSION

### CLAUDE BERNARD'S CONCEPTION OF THE INTERNAL ENVIRONMENT

PROFESSOR L. J. HENDERSON entitles his valuable recently published book on "Blood" as "A Study in General Physiology," and at the same time treats blood as a physico-chemical system. It may escape notice that he thus makes a very far-reaching fundamental assumption; and the matter is so important that I ventured to bring it before the British Physiological Society on March 16. He refers to the authority of Claude Bernard in justification of his procedure; but in so doing he seems to me to have altogether misunderstood Bernard's conclusion. Bernard was the first to formulate the extremely fruitful idea that the blood of a living animal is an internal medium kept remarkably constant as regards its physico-chemical conditions by the coordinated influence upon it of the various organs of the body. He accepts as fundamental the coordination thus displayed. L. J. Henderson, on the other hand, treats the blood as simply something which, as the result of various "buffer" reactions occurring within itself, is not as readily disturbed in its physico-chemical conditions as other liquids would be. We can, for instance, add a good deal of acid or alkali to blood without much disturbing its reaction. Or if we simultaneously add carbon dioxide and abstract oxygen from it there is a similar diminution of the disturbance which would be produced by either addition of carbon dioxide alone or abstraction of oxygen alone.

These buffer reactions are of great importance and interest, but they were unknown to Bernard, and do not in any way modify his conception of the coordinated activity of organs by which the conditions in the blood are kept constant. This coordinated activity is an essential part of his conception of blood in the living body, whereas L. J. Henderson leaves it out of account, thus turning blood in the living body into what for a physiologist is a mere artifact, and completely disregarding Bernard's principle. It seems to me that if we disregard the coordination we have disregarded all that is characteristic of life, and that therefore the book in question can not be regarded as a study in general physiology, but only as a study in physical chemistry.

To come to details, L. J. Henderson treats the constancy of reaction in the living body as if it depended on the physico-chemical properties of blood. In actual fact this constancy depends during health on the coordinated activity of the kidneys and respiratory organs, in accordance with Bernard's principle; and in various individual parts of the body the constancy depends on the coordinated or regulated influence of the circulation. Not all the buffering in the world

would keep the reaction constant otherwise, though the buffering greatly smooths the regulation. In the human body acid in excess is being continuously produced, partly as ionized sulphuric and other non-volatile acids, and partly as ionized carbonic acid. The formation of acid is constantly being exactly compensated by the excretion of acid urine and formation of ammonia on the one hand, and on the other by the washing out of carbon dioxide through the lungs. The exact coordination or regulation of these activities is the essential matter, and the quantitative investigation in various directions of physiological coordination in recent times has separated the old mechanistic physiology of last century from recent physiology. The normal responses of the kidneys and respiratory organs depend on the simultaneous maintenance of many conditions included under the comprehensive word "health"; but we assume this maintenance in quantitative investigations of physiological function.

If, following L. J. Henderson, we neglect active organic coordination, we are, it seems to me, taking a step backwards. As one who has been closely connected during the last thirty years with the development of Bernard's conception, as well as with the development of knowledge as to the physical chemistry of blood, I wish, therefore, to express my dissent from what appears to me to be L. J. Henderson's misinterpretation of Bernard. In my book, about to be published, on "The Sciences and Philosophy," I have discussed the subject from a wider standpoint, but before I had seen L. J. Henderson's book. It seems to me that apart from the central biological conception of specific coordination we can not make even a beginning in the scientific treatment of general physiology, whether we start from the unicellular organisms which Henderson unjustifiably assumes to consist of a physico-chemical system called "protoplasm," or from compound organisms with a well-defined internal environment between individual cells.

J. S. HALDANE

UNIVERSITY OF OXFORD

## METABOLIC ACIDITY OR ALKALINITY OF FOODS

IT is well recognized that complete oxidation of foods yields mineral residues of neutral, acidic or basic character. These residues are essentially the same as produced by laboratory incineration or by the reactions of metabolism in the animal organism.

Nutritional literature refers to the "acid or base forming tendencies" of foods. Foods are said to have "potential acidity or alkalinity." This "potential acidity or alkalinity" is entirely independent of and distinct from the "acidity" or "alkalinity" of the food in its natural state.

The particular phraseology "potential acidity or alkalinity" lends itself to possible confusion with "acidity or alkalinity," or at least does not make the distinction as apparent and distinct as it might be. It is proposed that a more exacting terminology be adopted for "potential acidity or alkalinity."

"Potential *metabolic* acidity or alkalinity" or more simply still "*metabolic* acidity or alkalinity" seems to define appropriately and specifically the reaction character of food mineral residues subsequent to the reactions of metabolism. The "metabolic acidity" and the "acidity" of a food are not subject to confusion or interchange even to the superficially tutored.

RAYMOND HERTWIG

## THE OCCURRENCE OF BOTHRIOPLANA IN THE UNITED STATES

IN a note to SCIENCE on the occurrence of *Otomesostoma* in this country, published in the October 12, 1928, issue, mention was made of the existence in this vicinity of several unidentified rhabdocœles thought to belong to the subclass Alloiocœla. Since that time I have definitely identified one of these as *Bothrioplana*.

Individuals of this genus have been known to this laboratory for three years, but had not been studied in detail until this fall. They occur in abundance in the outlet of the University of Virginia gymnasium pool, where the water is swift and clear; and in a branch from a spring on the adjoining golf course. The specimens are large, and may easily be mistaken for a species of *Planaria*.

Under laboratory conditions the animals have produced three eggs each in a single period of sexual maturity. The eggs are large, 390 micra in diameter, and unstalked. The embryos develop in twenty-one days at room temperature and emerge through an operculum at one pole. Work is in progress on the histology of some of its organs of special sense. This is the first record of this genus in the United States. Stienböck, in a recent paper entitled "Beiträge zur Kenntnis der Turbellarienfauna Grönland," 1928, has included it in the fauna of Greenland.

J. S. CARTER

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## AN UNUSUAL SOURCE OF LIVING MATERIAL

IN most localities that have winter seasons during which the temperature drops below freezing, it is probably not ordinarily possible in these months to collect living specimens of microscopic forms of life. This is especially true of those places that have winter climates that may be called rigorous. From all accounts the winter season just closing has been uncommonly severe. Here at Gunnison, which may be taken