

**RESEARCHES ON
THE CHEMISTRY OF
FOOD**

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Researches on the Chemistry of Food by Justus Liebig & William Gregory

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JUSTUS LIEBIG & WILLIAM GREGORY

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EDITOR'S PREFACE.

IN offering to the British public the present translation of the latest work of Baron Liebig, I may be permitted to say, that I feel highly honoured in being intrusted with the duty of conveying to my countrymen a knowledge of one of the most interesting and valuable investigations which has yet been made in Animal Chemistry.

The researches into the nature of the soluble constituents of muscle or flesh, which constitute the chief part of the present work, are preceded by considerations on the true Method of Research in Animal Chemistry, which are worthy of the most earnest attention on the part of those who intend to devote themselves to investigations in this most important and at the same time most difficult department of science. A careful study of this section will convince the reader that much more might have been done of late years in Physiological Chemistry, but for the wrong direction unfortunately given to recent researches, and will

powerfully contribute to direct into the right channel the energies of those rising chemists to whom Britain must look to sustain her scientific reputation in the present age of rapidly advancing discovery in the most recondite parts of Organic Chemistry and of Physiology.

The physiologist will also find in this introductory section, the most convincing reasons to show that, henceforth, it is indispensable that Anatomy, structural Physiology, and Chemistry should unite their forces with a view to the solution of the great questions which it is the common object of these sciences to solve.

With regard to the chemical researches contained in the present work, it is most emphatically to be stated, that they constitute only the first steps in an almost new career; that they are very far from exhausting even the single subject here investigated, namely, the nature of the soluble constituents of the muscles; and that, consequently, they are chiefly valuable as indicating the true path at present to be pursued by chemists. It would be contrary to the principles as well as to the wishes of their author, if physiologists were to regard them as completed, or as in any one point exhausting the subject; and how many more subjects does the animal organism present, which must remain obscure and impe-

netrable till they shall be studied on principles analogous to those which have guided the author?

Nevertheless, these researches have already thrown much light on many important but obscure questions; and independently of the interest which, in a purely chemical view, they must always have for the chemist, they will be found, by the physiologist and the medical man, both interesting and valuable in a very high degree.

In connection with previous researches, they serve to demonstrate, that the more we know of the processes going on in the organism, the more do we find these to involve strictly chemical changes, and to be capable of a chemical interpretation. It would indeed appear as if every change in the organism were attended by a definite chemical or physical action; and although we shall probably never succeed in unveiling the nature of the peculiar influence, called vitality, under which these changes occur, yet the present as well as previous investigations render it certain that we have still a great deal more to discover concerning the share taken by chemical action in the vital processes.

I cannot omit to direct the attention of physiologists to the proofs, contained in the following pages, of the truth of the principle, that every property, however apparently trifling or minute,

possessed by any constituent of the organism, even by such as occur only in very small proportion, has its destined use and function; and, consequently that every constant difference, whether of composition, of form, or of quality, in the different tissues and fluids, must likewise correspond to a difference of function, in which, as a general rule, it cannot be replaced, nor its absence compensated for, by any other substance, however analogous in most of its properties.

A striking example of this truth will be found in the facts concerning the great preponderance of phosphate of potash and chloride of potassium in the juice of flesh, while in the blood and lymph which circulate through the muscles, it is phosphate of soda and chloride of sodium which prevail. Another will be found in the fact that the juice of flesh is always strongly acid, while the blood and lymph are decidedly alkaline; and a third is seen in the abundant supply of lactic acid in the juice of flesh, while it cannot be detected in the urine.

But perhaps the most interesting observation, next to the discovery of kreatine as a constant ingredient of flesh, of kreatinine, a powerful base, in the juice of flesh, and of both in urine, is the demonstration, complete, as it appears to me, of the true function of the phosphate of soda in the blood.

This function, that of absorbing carbonic acid and giving it out in the lungs, is here shown to depend entirely on the minute chemical characters of the salt in question; and we now see how it happens that phosphate of soda is essential to the blood, and cannot be replaced by phosphate of potash, a salt, which, although in many points analogous, differs entirely from phosphate of soda, in its tendency to acquire an acid instead of an alkaline reaction, and in its relation to carbonic acid. In this way, the beautiful researches of Graham on the phosphates are now finding their application, in the minutest point, to physiology. The same remark applies to the action of common salt on phosphate of potash, which satisfactorily accounts for the presence of phosphate of soda in the blood of animals whose food contains only phosphate of potash, but which either find common salt in their food, or obtain it as an addition. Surely such facts as these must convince all men of the value of the most minute study of the chemical properties of all the substances which occur in the organism, however these properties may at first appear trifling or unimportant; and of the utter impossibility of making progress in Physiology without the aid of Chemistry. I would also direct attention to the evidence here given of the fact, that the parietes of