

**TEXT-BOOK OF
ORGANIC CHEMISTRY
FOR MEDICAL STUDENTS**

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Text-Book of Organic Chemistry for Medical Students by Dr. G. v. Bunge & R. H. Aders
Plimmer

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FOR
MEDICAL STUDENTS

BY
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PREFACE

THE domain of organic chemistry has been widened to such an enormous extent by the unceasing labours of the last decades, that even those who devote their life to the study of this science can no longer be masters of the whole subject. The medical student, however, is compelled to acquire some knowledge of all the branches of organic chemistry, for there is scarcely a chapter of the subject which has not already found application in Physiology, Pathology, Pharmacology, Hygiene, etc.

It is quite impossible for the student of Medicine to find out for himself what is for him important and essential amongst the immense mass of chemical facts at his disposal. The necessity has therefore arisen for treating the rudiments of organic chemistry in a manner especially adapted to the requirements of medical students, and it is with this object that I have written the present lectures. I have tried to select, and to call special attention to, those things which are most important, and at the same time to point out in which branch of Medicine these selected facts of organic chemistry have found application.

During my thirty years' experience of teaching I have seen that the majority of medical students are not in the position to assimilate even the most important results in organic chemistry from our present text-books, and I have therefore endeavoured to put the

matter into such form that the beginner will not be wearied or lose his interest. If, however, his interest be once awakened by such a very incomplete text-book, these deficiencies can be gradually filled in by repeated references to the more detailed epitomes. My lectures are not intended in any way to supplant those valuable and complete text-books on organic chemistry which we at present possess.

G. v. BUNGE.

BASEL: *February* 1906.

TRANSLATOR'S PREFACE

SUFFICIENT apology for the appearance of another text-book on organic chemistry has been given by Professor Bunge in his Preface, and the same reasons should also suffice for this introduction of his book to English medical students. The subject has been presented by the author in such a new and interesting manner, that it seemed to me that his book would appeal to English as much as it has done to German students; if their interest in the subject be once aroused, the problems in biological chemistry which offer themselves will be no longer altogether devoid of meaning, since the facts brought forward are here set forth in their direct relationship to Physiology, Pathology, and Medicine. Physiological chemistry is really a branch of organic chemistry, and if the latter term were not exclusively used, as it is nowadays, for the chemistry of the carbon compounds, the term organic chemistry would still comprise, as it did before 1828 when Woechler synthesised urea, those chemical compounds which are found in animals and plants, their mode of formation, and their interactions—i.e. the subjects with which physiological chemistry now deals. Many, perhaps all, of the processes, as they occur in the animal and vegetable tissues, may follow lines identical with those produced by the chemist in the laboratory, and it is only by means of a knowledge of the chemistry of the carbon compounds that their relationship to one another in nature can be determined. The one is chemists' chemistry with organic substances, the other Nature's chemistry with the same substances. This knowledge of the chemistry of carbon compounds is essential to any further discoveries in the methods and processes of Nature's chemistry.

As the requirements of English medical students are somewhat

more extended than those of German students, several additions have been found necessary. These are indicated by the use of square brackets, in order that Prof. Bunge's work should be clearly visible. A few minor alterations have also been made with the view of better conforming to a more logical chemical arrangement—e.g. the chemistry of acetone has been removed from Lecture 4 to Lecture 5; Lecture 6 has been subdivided into two parts, and the glucosides removed from Lecture 15 to Lecture 9, with the consequent alteration of the subsequent lecture numbers. Chemists usually describe the glucosides with the carbohydrates, and this is especially necessary in connection with the modern work on the carbohydrates. The phenylhydrazine derivatives of the sugars have also been removed from the aromatic series to the chapter on the carbohydrates. Further, adrenaline has been placed at the end of Lecture 13 instead of Lecture 16, since it is, in reality, an aromatic compound and does not belong to the group of the alkaloids, in conjunction with which it was described. Again, in the chemistry of the proteins minor alterations have been made in order to conform to the new nomenclature as recommended by the Physiological and Chemical Societies; it was also desirable to briefly mention the work of E. Fischer on the synthesis of the proteins. These alterations do not essentially impair the value of Professor Bunge's book, since his exposition remains unchanged.

It was in the hope that organic chemistry might be brought nearer to physiological chemistry, and that their present wide separation might soon disappear, that I undertook this translation. Whether this hope will be realised remains in the hands of the readers of this excellent book by Professor Bunge.

R. H. ADERS PLIMMER.

UNIVERSITY COLLEGE, LONDON:
August 1907.

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UNIVERSITY OF
CALIFORNIA

ORGANIC CHEMISTRY

FOR

MEDICAL STUDENTS

LECTURE I

THE RISE OF ORGANIC CHEMISTRY DURING THE LAST DECADES

THE compounds of the element carbon constitute the subject of organic chemistry. Organic chemistry was called the chemistry of the carbon compounds, because, until recent times—up to about forty years ago—it was thought that the carbon compounds, with few exceptions, could only be formed in organic beings, whether plant or animal; they were a testimony of vital processes and could never arise outside the organism. The Swedish chemist Berzelius (1779-1848), one of the most distinguished investigators of all times and countries, in 1837 said: 'In living nature the elements appear to obey laws quite different from those they obey in dead nature; the products of their mutual interactions are quite different in organic from those in inorganic nature, and the discovery of the causes of these differences between the behaviour of the elements in dead nature and in the living body will be the key to the theory of organic chemistry. It is hidden in such a way that we, at any rate at the present time, are entirely without hope of being able to discover it.'¹ And in 1842 Gerhardt (1816-1856), a chemist who made many important advances in organic chemistry, said: 'The chemist works in a manner quite opposed to that of living nature: he burns, destroys, works by analysis; vital force alone works by synthesis: it reconstructs the edifice destroyed by chemical forces.'² This conception prevailed for nearly

¹ J. J. Berzelius, *Textbook of Chemistry*. Translated into German by F. Wochler. Vol. iv. p. 3. Dresden and Leipzig, 1837.

² Charles Gerhardt, *Compt. rend.* 1842, vol. xv. p. 498.