# LABORATORY STUDIES FOR BREWING STUDENTS, A SYSTEMATIC COURSE OF PRACTICAL WORK IN THE SCIENTIFIC PRINCIPLES UNDERLYING THE PROCESSES OF MALTING AND BREWING

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BY

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*WITH 36 ILLUSTRATIONS*

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# PREFACE.

Some years ago, when it fell to the author's lot to arrange a course of instruction in the principles of brewing for his students at the University of Birmingham, an examination of the literature of the subject showed that there was no book in existence which could be used as a systematic guide to practical work in the laboratory, and as the author recognised that a sound knowledge of the principles of brewing must be based on work of this nature, it became necessary to draw up a course of laboratory studies for the special use of his students. This course, subject to alterations and additions suggested by experience and by the progress of knowledge, has now been in use for several years, and as it has been found to fulfil its requirements in a satisfactory manner, the author now ventures to publish it in the hope that it may contribute in some measure towards filling a gap in the literature of brewing.

The work is essentially a student's laboratory

guide, and must not be regarded in any way as a text-book of the scientific principles of brewing as it confines itself mainly to descriptions of experimental work. It is intended for use under the supervision of a competent instructor, and it is assumed that the student is able to attend lectures on the subjects upon which he is working.

The chief difficulty of a study of the scientific principles underlying brewing practice lies in the fact that as it so often touches the limits of our present knowledge there are many questions which have to be studied about which there exists considerable uncertainty and difference of opinion. This naturally raises difficulties for the teacher, for, on the one hand, it is well recognised that some amount of dogmatism in teaching is necessary when introducing a new subject to the student, and, on the other, the state of our knowledge of certain of the questions dealt with in these studies does not justify dogmatic treatment. The position may be illustrated by a consideration of the very important and difficult problems of the constitution of the starch molecule and its transformation by diastase. A large amount of knowledge on these points has been accumulated, and many varied views have been advanced by different investigators concerning them, but none of these views have met with general acceptance, even of a provisional

nature. This is due no doubt partly to the exceptional difficulties which surround the study of starch and its transformation by diastase, and partly to a militant spirit which appears to emanate from the starch molecule and influence the minds of most of its investigators.

How is this state of affairs to be met by the teacher? An attempt to lay before the student at the commencement of his studies all the different views concerning starch and its transformation products must result in reducing his mind to a state of chaos. It appears to the author that the only satisfactory course open is to teach those views which lend themselves best to explanation and demonstration, and, when the student is sufficiently advanced, to encourage him to criticise such views and compare them with others.

This is the method of teaching attempted by the author, and it is followed in this book with regard both to experimental studies, and to a consideration of the analytical processes employed in the brewery laboratory, many of which cannot be regarded as above criticism.

The course of studies might perhaps have been advantageously lengthened, but it had to be borne in mind that the majority of students are unable to devote more than one year to such studies. A good worker who has previously had a sound