ELEMENTARY MICROSCOPICAL TECHNOLOGY: A MANUAL FOR STUDENTS OF MICROSCOPY. IN THREE PARTS. PART I

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IN THREE PARTS.

PART I.

THE TECHNICAL HISTORY OF A SLIDE

FROM THE CRUDE MATERIALS TO THE FINISHED MOUNT.

BY

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PREFACE.

IN all existing text-books of microscopical technology with which I am acquainted, not only in the English, but in the French, German and Italian tongues, the technology proper—or the manipulations and processes incident to the preparation of material for microscopical examination, is so mixed up with the micrography—histological, pathological or biological, that it is an almost hopeless task for the student, especially the beginner, working without a master, to separate them. In the multitude of details and the interruptions to continuity caused by the attempt at teaching simultaneously such widely divergent subjects, the elementary student fails to grasp a clear idea of either the one or the other.

Another difficulty, incident to and inseparable from instruction attempted to be conveyed in this manner, is that the author must, at many points anticipate details or presuppose some acquaintance with the subject on the part of the student.

Realizing these difficulties, first as a student remote from skilled teachers, slowly working out by experiment each problem as it arose, and afterwards as a teacher, searching for a text-book to put into the hands of my students, I finally undertook the preparation of a manual modelled after an ideal in which nothing should be taken for granted, no previous acquaintance, on the part of the student, with the subject-matter presupposed, and in which

each step of the work, each process and manipulation should be explained in orderly sequence.

This little manual is the result of this idea; how well I have succeeded in its execution is for the reader to say. I will only add that I have endeavored to make it strictly practical, having embodied in it the actual experiences of many years of almost incessant labor in this direction.

The present volume is devoted entirely to Elementary Technology, and details the Technical History of a Slide from the crude materials up to the finished mount. It constitutes Part I of a work on General Microscopical Technology constructed upon the same scheme and plan, the other parts of which will appear in due time.

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Elementary Microscopical Technology.

I.

Microscopical technology is a description of those processes and appliances by means of which objects are prepared for examination under the microscope and permanently preserved for future reference and study. In microscopy, as in every other pursuit which involves the use of tools or instruments, the number and nature of the apparatus and appliances deemed necessary for the performance of good work will vary very greatly according to the taste, ingenuity, and above all, the pecuniary ability of the individual. While some men will be content and do good work with a few simple instruments, costing but a few dollars, others will require the most elaborate outfit, costing as many hundreds. In the present series of articles I shall describe only those instruments which experience has taught me to be absolutely essential, leaving the student to learn from more elaborate text-books and the catalogues of the instrument makers, those more complicated appliances which, while they are frequently of great assistance, are not absolutely essential in doing good work and hence must be considered as *articles de luxe*.

§ I. The processes through which an object passes from its crude or natural condition up to the finished slide, ready for the cabinet, vary according to the nature of the material. They may be grouped under six general headings, viz;

a. Preserving in the mass.

b. Hardening those substances which are too soft, and softening those which are too hard to be cut with the section knife.

c. Embedding.

d. Section cutting.

e. Staining.

f. Mounting on slips.

Some objects have to pass through all of these processes,

while others have to undergo only a portion of the manipulations indicated.

§. II. The instruments and apparatus required for the performance of each step will be described under its proper heading. There are, however, certain tools which are required in almost every stage of our progress, and it will be well for the student to provide himself with them at the outset. They are as follows:

a. A half dozen needles mounted in wooden handles. Four of these should be straight and the others curved. Surgeons needles are the best for this purpose, though ordinary sewing needles will answer for the straight ones. The handles should be five or six inches long and large enough to give a good 'grip' to the fingers. Tapering cedar penholders are excellent for the purpose. The needles should be inserted into the small end and carried deep enough to be perfectly firm. They should not project more than three-quarters of an inch from the handle, as otherwise they are too springy for delicate dissections.

b. Small forceps, straight and curved. The ordinary iris forceps are excellent for this purpose. If dentated, the teeth should be ground or filed out and the ends of the blades brought to a point.

c. Small scissors—straight and curved.

d. A few delicate scalpels. Old tenotomes, or cornea-knives, well sharpened are the very things. Almost every oculist has some such knives which have become useless for his work but which answer admirably for microscopical dissections.

e. A dozen watch crystals. The old fashioned 'bulls-eye' cystals are the best. They may be obtained from any large jewelry establishment for a trifle. Two or three "individual salts" will also be found useful.

f. Three flat saucers, like those used for shirred eggs.

g. A wash-bottle holding 10 or 12 fluid ounces of distilled water.

h. A half dozen medicine droppers or pipettes.

i. A half dozen camel's-hair pencils, assorted.

j. Small spirit lamp and stand.

k. Salt mouths for preserving crude material. Sulphate of morphia bottles fitted with good soft corks are very useful for