

**PRACTICAL FIRST PRINCIPLES:  
SIMPLIFYING THE STUDY OF  
NORMAL AND ABNORMAL  
STRUCTURE AND FUNCTION,  
AND AIDING DIAGNOSIS**

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Practical First Principles: Simplifying the Study of Normal and Abnormal Structure and Function, and Aiding Diagnosis by A. H. P. Leuf

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# PRACTICAL FIRST PRINCIPLES

SIMPLIFYING THE STUDY OF NORMAL AND ABNOR-  
MAL STRUCTURE AND FUNCTION, AND  
AIDING DIAGNOSIS

*DESIGNED FOR THE USE OF STUDENTS AND  
PRACTITIONERS OF MEDICINE*

BY

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## P R E F A C E .

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The object of this little book is to simplify the study of medicine for the beginner, and to connect the various subdivisions of this science in the minds of the busy practitioner in a rational and readily comprehended manner. There are, it seems almost needless to say, many who do not require this aid, and for such it is not intended, but it is offered to those who may find it useful. Its inception was the crystallizing experience of lecture room, dissecting room, and private teaching of students more than fifteen years ago. The plan followed in these pages is the same as that which in the past gave many a backward student a new impetus upon the highway of medical learning, as evidenced by his readier understanding of his lessons, and his improved standing in quizzes and periodic review examinations.

The aim is to stimulate study upon philosophic lines—to encourage the reasoning faculties. Facts are treated as of the first importance, and certain principles underlying these as second in value, while the reader is encouraged to so apply known principles to facts as to lead to true inductions by a route that is at once easy and pleasant. Medicine is a philosophic study and should be taught as such. It is a connected whole, and not, as the student and many practitioners so commonly imagine, a series of separate entities because of the numerous sub-divisions into departments and specialties.

The true, or ideal, physician is the one to whom all parts of the body clearly reveal their harmonious similarity under all conditions, whether of health or disease. This is not intended, however, as an objection to specialism, but against the kind of specialism which entails real ignorance of those parts and functions of the body not directly connected with the special branch that is practiced. The best specialists are a gradual product, and are evolved from the successful general practitioner. These form the pioneer advance guard of medical progress, and are essential to the quickest development of medical art. But the function of the general practitioner is hardly secondary to that of the specialist even from this standpoint, for he correlates, connects. It is he who takes up the many separate threads and weaves them into the substantial and enduring fabric.

A true knowledge of the body requires, first of all, familiarity with all its parts, even to its minutest sub-divisions. This constitutes anatomy inclusive of histology—the study of structure. This information is of limited value without a knowledge of the functions of all these parts, and their relations to one another as a whole. This constitutes physiology—the study of function. Anatomy and physiology give us the normal, and familiarity with the normal structure and functions of the body enables us to detect deviations therefrom; tells us when the individual is ill at ease, dis-eased. To identify and classify the trouble involves an understanding of changed function under altered conditions, of modified action and structure. These are morbid, or abnormal, conditions, change of structure, perversion of function. This constitutes pathology—the study of abnormal anatomy and physiology.

A full understanding of these three, therefore, in their broadest sense, namely, anatomy, physiology, and pathology, make the diagnosis of disease and its rational understanding possible, thus indicating with precision the effects required of the remedies that are to be applied.

For the intelligent and efficient treatment of disease, it is necessary to know the various remedial agents and measures, together with their effect upon structure and function in health and disease. This constitutes materia medica and therapeutics—the study of remedies and their effects upon the structure and functions of the body, both normal and abnormal.

These, then, may be called the major divisions of medicine; anatomy and physiology, to enable us to detect deviations from the normal (disease); pathology, to specify the deviation (diagnosis); and materia medica and therapeutics, to rationally and effectively treat disease in accordance with what is known of its behavior.

The illustrations are almost all original and diagrammatic, the former with a view to avoiding marked connection with any given text-book, and the latter so as to impress a principle upon the reader's mind rather than a set picture which he never sees for the reason that it does not exist.

It was finally decided, in consequence of the predominance of the histologic feature in these pages, to append a chapter upon the use of the microscope, giving such hints as would enable readers requiring the information to better understand the mechanism and use of the instrument.

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## CHAPTER I.

### THE CELL.

"Are we cell aggregates?" asked Montgomery, of Texas, in 1881, in Pfluger's Archive. There can be no doubt of it. The cells are connected, however, but not like so many bricks in a house. True, there is a "cement substance" between them, but this has only been studied in death. The union of some cells is more direct, for instance more like that of the leaves of a tree. Cells often are so many Siamese twins in their intimate organic connections. They have their individual being in one sense, while in another they have direct and indirect continuity. Their contents frequently intermingle through connecting bonds.

#### The Protameba.

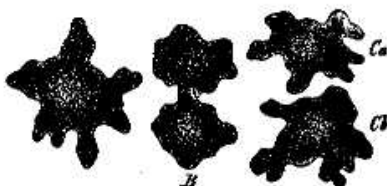
The simplest form of life consists of an easily flowing, gelatinous like, mass called protoplasm in general, and known in its most independent form as the protameba.<sup>1</sup> It is one of the simplest forms of animal beings, having an irregular, constantly changing outline, and appearing uniformly homogeneous,<sup>2</sup> with large and small granular sprinklings under a glass of moderate power. It is a nitrogenous carbon compound of albumin, and often contains fat and sometimes mineral substances. It coagulates in death and at a comparatively slight elevation of temperature. It has the property of extending parts of itself in any direction to a sufficient extent to encircle other objects and draw itself completely around them. In this way it gets its nourishment, extracting from particles thus met in its path whatever is of advantage, and allowing the remainder to fall away from any part of itself where it happens to be nearest the surface; this is ingestion.<sup>3</sup>

<sup>1</sup> From *πρώτος*—first, and *αμείβω*—change.

<sup>2</sup> Meaning the same kind, from *ὁμοίος*—the same, and *γένος*—kind.

<sup>3</sup> From the Latin *ingerere*, *ingestum*—to place in, as into the stomach.

Following a universal law of nature, it seems evident that the protameba grows because it ingests, and such is the fact. It also gets rid of waste products and unassimilated material, and therefore egests,<sup>4</sup> from all of which it further follows, that it does work. Lastly, according to another law, it reproduces its kind. This is done in the simplest possible manner



*The Protameba.* B, showing commencing division, and C<sub>1</sub> and C<sub>2</sub> the two parts after complete separation (Frey).

by parts separating from the original and growing to adult proportion, when they, in their turn, give birth to other protamebae. This simplest of all forms of animal life is found upon the surface of the seas.

#### The Ameba.

Another one of this class of bodies is found among the protamebae, but it is more active, contains a spheroidal structure, with granular contents, called a nucleus; and a larger amount of nutritive and alimentary contents, foreign unassimilable matter and air spaces or sacs. This is the ameba.<sup>5</sup> The protameba and the ameba, therefore, though the simplest forms of life, ingest, egest, work, grow and reproduce their own kind. This is the characteristic of all living matter, as we shall see in the following pages, and it is so because all living matter is composed of colonies and vast governments of amebae or their equivalents—cells. We ourselves are, therefore, nothing but vast complex collections of cells or modified amebae acting in concert as a connected whole.

#### The Cell.

The cell is the anatomical unit or element. It bears very much the same relation to our bodies that the molecule does

<sup>4</sup> From the Latin *e*—out, and *gerere*—to place or carry.

<sup>5</sup> From *ameba*—change.