PHYSIOLOGY, A MANUAL FOR STUDENTS AND PRACTITIONERS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649169115

Physiology, a manual for students and practitioners by Frederick A. Manning

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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FREDERICK A. MANNING

PHYSIOLOGY, A MANUAL FOR STUDENTS AND PRACTITIONERS

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PHILADELPHIA:

LEA BROTHERS & CO.

PREFACE.

THE present book is a brief summary of the salient features of Human Physiology. It is not intended to compete with nor to take the place of the more elaborate text-books. The idea has been to present the subject in such a manner as to fix in the memory facts already learned in less limited treatises.

There is no claim of originality for this book. It is practically and of necessity an abstract of standard works, and principally of those of Dalton, Foster, and Kirke. The arrangement has, in a general way, been made to conform with that of the last-named authority. The cuts are many of them from Dalton's *Physiology*. Doubtful questions have often been referred to Foster, whose *Text-book of Physiology* is the reference-book of a large proportion of the schools. Some of the histological descriptions are derived from Prudden's *Practical Normal Histology*.

NEW YORK.

CONTENTS.

APPENDIX.

PHYSIOLOGY.

GENERAL CONSIDERATIONS AND PROXIMATE PRINCIPLES.

Define human physiology.

HUMAN PHYSIOLOGY is that branch of biology which refers to the functions and properties of the organs in the living human body.

In entering upon the study of the functions of organs it becomes desirable to understand something of the nature of the fundamental elements of living tissue which we call cells.

What are cells?

Cells may be described as nucleated masses of protoplasm of microscopic size, usually possessing limiting membranes known as cell-walls, and capable of passing through the changes which are characteristic of life and death. Some cells do not possess a nucleus, but this is quite exceptional. More commonly each cell has a nucleus or more than one, and in many instances there is a nucleolus within the body of the nucleus.

What is protoplasm?

Protoplasm is an unstable albuminoid substance of more or less gelatinous nature. Its reactions are those of albumin (coagulation by heat and mineral acids), and its chemical composition is of varying proportions of the elements C, H, N, O, S. Protoplasm is living albumin or proteid.

Illustrate the life of the cells by the amœba.

The characteristic changes through which cells pass are well illustrated by the amœba: (*a*) The power of spontaneous movement, in which a small portion of the cell is first advanced, and

then the whole cell seems to flow to and into its branch. (*b*) Motion in response to various physical and chemical stimuli. (*c*) The power of taking food, absorbing portions and rejecting the rest. (*d*) Reproduction of its kind. This is accomplished by splitting of the cell into two, each with its own nucleus and life-history. (*e*) Death, in which the constituent elements undergo chemical changes. All cells follow more or less closely this cycle of changes by which we differentiate living matter from unorganized substances.

Name some of the kinds of cells found in man.

Epithelial, connective-tissue, blood-, and nerve-cells.

What is epithelium?

The name "epithelium" is given to the cells which cover the skin, mucous and serous membranes of the body, and also enter into the formation of the glands. Its varieties are—(1) *Simple*, a layer of flat (squamous), cubical, (spheroidal), or cylindrical (columnar) cells, as in the serous and mucous surfaces; (2) *stratified*, when it occurs in layers, as in the skin; (3) *transitional*, where it has the characteristics of both in situations where the other two forms approach one another, as in the ureters. (4) In the glands are found *functional cells*, which partake of the character of the epithelium of the surface. They are arranged in groups about the ducts. Such cells are often known as secreting or glandular epithelial cells.

What is ciliated epithelium?

The simple epithelium possesses hair-like processes in certain locations, and this is known as *ciliated epithelium*. The hairs are endowed with motion, and wave in such manner as to throw forward small particles which fall upon them.

Name the chief uses of epithelium.

Protection, as skin, serous surfaces; motion, ciliated epithelium of air-passages and Fallopian tubes; secretion, in glands—*e. g.* gastric juice; sensation, in the cones of the retina, olfactory cells of nose, etc.

What is endothelium?

It is a simple form of squamous or scale-like, flat epithelial cells which line the serous membranes and the blood-vessels. The cells

are very delicate, and are not stratified. They are of various forms, usually irregularly polygonal, and are joined at the edges so as to form a sort of mosaic.

What are connective tissues?

They are the structures which form the frame and supports of the body and of the organs of the body. The ligaments, tendons, fasciæ, cartilage, and bones are examples of them. The fibrous connective-tissue cells are found in all organs in greater or less amount. In the organs whose use is the support of the body or one of its members these cells predominate. In other organs the fibrous cells serve to hold in place the functional cells and to maintain the shape of the organs.

What are the proximate principles of the body?

They are the substances entering into the composition of the body, and are inorganic and organic.

What are the inorganic elements?

Chemically, C, H, O, N make up a very large portion of the body-weight, water alone (H_2O) forming about three-fourths of the total. Besides these, sodium, potassium, lime, and magnesium, in chemical combinations with sulphur, phosphorus, chlorine, and carbon (sulphates, phosphates, chlorides, and carbonates), are found in considerable amounts, and less abundantly iron, silica, and fluorine. Occasionally minute quantities of some of the other metallic elements—arsenic, lead, copper, and manganese—are found.

How are the organic proximate principles classified?

(1) Nitrogenous, and (2) non-nitrogenous.

(1) The former take the principal part in the formation of solid constituents of the body, and occur in all the body tissues and fluids. They make up the protoplasm of cells and essential ingredients of the fluids, both circulatory and excretory. Chemically, they are compounds of C, H, O, N, sometimes with sulphur or phosphorus.

(2) The latter (non-nitrogenous) class of bodies are made up of the fats and carbohydrates.

What is the reaction of the fluids of the body?

Alkaline, with only four notable exceptions. These are—gastric juice, perspiration, vaginal mucus, and acid urine.