

**A NEW METHOD
WITH PHYSIOLOGY**

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A New Method with Physiology by J. H. Diebel

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BY

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ARITHMETIC BY ANALYSIS, NEW METHOD
WITH GEOGRAPHY, ETC.

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PREFACE.

EVERY skilled workman follows some plan in the execution of his task. No one is able to perform a piece of work with artistic neatness who does not have his method of operation well formulated, and who does not, in his mind's eye, see the beginning, the progress, and the completion of his labor.

So, every teacher who would be skilled in his profession, must look over the field which lies before him, and must arrange the material so systematically and logically correct that the subject may unfold itself to the learner in an intelligible, progressive, and interesting manner. With this in view, devices and expedients will suggest themselves, and that enthusiasm so necessary to mental development will be assured.

The following outlines may be used with much advantage in any class, and with any text book, yet the author hopes that they may be used rather as models by the aid of which the enterprising teacher may make outlines more especially adapted to his class, and to the text book in use. Or, better still, he may teach his class to do this.

The supplementary questions and answers are designed to stimulate research, and to bring out such points of interest, and such discussions, as may be of importance to the student, but which are not always found in the text books.

J. H. D.

WEST UNITY, O., *January, 1895.*

LESSON I.
MATERIAL SUBSTANCES.

TOPICAL OUTLINE.

I. Inorganic Bodies.

1. Mineral Kingdom.

- 1. Origin;
 - 1. Gravitation;
 - 1. Gravity; 2. Cohesion;
 - 3. Chemical Affinity.
 - 2. Crystallization.
- 2. Condition;
 - 1. Similarity of Parts;
 - 2. Absence of Organs;
- 3. Classification;
 - 1. Rocks; 2. Metals; 3. Water; 4. Air; etc.

II. Organic Bodies.

1. Vegetable Kingdom.

- 1. Origin;
 - 1. Composed of Cells;
 - 2. Formed from Air and Water.
- 2. Characteristics;
 - 1. Have a Period of Life;
 - 2. Dissimilarity of Parts;
 - 3. Grow Internally.
- 3. Classification;
 - 1. Phenogamia; 2. Cryptogamia.

2. Animal Kingdom.

- 1. Origin;
 - 1. Propagation; 2. Composed of Cells;
 - 3. Food;
 - 1. Organized Substances;
 - 2. Air and Water.
- 2. Endowments;
 - 1. Systems of Organs;
 - 2. Faculties of Special Sense.
- 3. Classification;
 - 1. Vertebrata; 2. Invertebrata.

SUPPLEMENTARY.

QUESTIONS.

1. Of what are air and water composed?
2. What difference exists in their formation?
3. What is meant by *chemical union*? *physical union*?
4. What are elements?
5. What are Phenogams? Cryptogams?
6. Do stones grow?
7. What are Vertebrates? Invertebrates?
8. What element in the air nourishes plants?
9. What constituent of the air sustains animal life?
10. What is an organ? A system? An apparatus?
11. What is chemical affinity?
12. What is a function?
13. Define Geology; Botany.
14. Define Physiology; Anatomy; Hygiene.
15. What opposing chemical changes are developed in the growth of plants and animals?
16. Do all animals have the power of moving about?
17. Have any plants the power of moving about?
18. How is it proved that plants take nearly all of their substance from the air?
19. Is it easy to distinguish between the lower forms of plants and animals?
20. What is Biology?
21. What is the chemical name for combustion? What does this term indicate?
22. What is chemistry?

ANSWERS.

1. Air is composed of two gases, oxygen and nitrogen. They are mixed together in the proportion of twenty parts of oxygen and seventy-seven parts of nitrogen.

Water is composed of oxygen and hydrogen in the proportion of one part of oxygen to two parts of hydrogen.

2. The elements of the air are not in chemical union and can be easily separated. The elements of water are in chemical union and can not be easily separated.

3. When elements are united chemically, they form a new substance and cannot be separated without destroying it. They can only be combined in certain proportions. When united physically the identity of the elements is not changed, and no new substance is really formed. They can be mixed in any proportions.

4. An element is one of the essential or principal parts of which a substance is composed. The term as used here has reference to atomic composition; as, for instance, when two atoms of hydrogen unite with one of oxygen the product is water.

5. Plants which bear flowers are called Phenogamous; those which bear no flowers are called Cryptogams.

6. Stones which are imbedded in the ground are supposed to increase in size by the petrification of the particles of earth in contact with them. Stones which are exposed are gradually crumbled by the elements.

7. The animal kingdom is divided into two divisions; those which have a back-bone—Vertebrates; and those which have no back-bone—Invertebrates.

8. The Carbon. See question 15.

9. The Oxygen. See question 15.

10. An organ is a certain part of the body which performs a particular work. A number of organs concerned in the performance of duties related in character is called a system. An apparatus is a collection of related systems.

11. Chemical affinity is that power which holds the different elements together, and causes chemical union. If chemical affinity should cease the human body (as well as all organic substances) would dissolve into three invisible gases, and a substance like charcoal.

12. The particular use of an organ system, or apparatus, is called its function.

13. Geology is the science which treats of the mineral constitution and structure of the earth. Botany treats of the structure, growth, functions and classification of plants.

14. Physiology treats of the organs and their functions. Anatomy treats of the structure of the body. Hygiene treats of the laws of health.

15. Plants, in their respiration, decompose the carbonic acid gas in the air, appropriating the carbon (which forms the greater part of their substance) and setting free the oxygen. In the respiration of animals (this term includes human beings) the oxygen of the air is combined with the carbon of the decomposing parts of the body and carbonic acid gas is formed. Thus, we see how plant and animal life are interdependent.

16. Some of the lower animals do not have the power of locomotion. The sponges, the "stone lily," and the lamp shell are specimens of animals that do not have these powers. In appearance they are much more like plants than animals.

17. A plant which grows in the Santee river floats about, attaching itself to objects, and freeing itself, by what seems like the plant's will. The Venus fly-trap, and the sun dew move their leaves on being touched.

18. Take a box and fill it with a certain weight of dry earth. Moisten it and plant a seed of some large, rapidly growing plant. When the plant has attained a considerable size, pull it up, dry, and weigh it; then weigh the earth (dried) again, and it will be found that the weight of the plant far exceeds the loss of weight of the earth. Whence did this extra material come? It is nearly all carbon, and it came from the air. It could not have come from the water because the water contains no carbon.

19. Plants and animals of the lower forms are very difficult to distinguish. The sponges were for ages classified as plants, but they are now believed to be animals.

20. Biology is the science of life.

21. Combustion is called *oxidation*. Fire is produced by the clashing of the atoms of oxygen with some other element. Without oxygen no combustion is possible. Oxygen burning in hydrogen gas forms water; burning in carbon gas it forms carbonic acid.

22. Chemistry is the science which treats of the composition of substances, and the changes in their composition.