

A MUCK MANUAL, FOR FARMERS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649182541

A muck manual, for farmers by Samuel L. Dana

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Cover @ 2017

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SAMUEL L. DANA

**A MUCK MANUAL,
FOR FARMERS**

A

MUCK MANUAL,

FOR

UNIV. OF
CALIFORNIA

FARMERS.

BY SAMUEL L. DANA.

"It is usual to help the ground with muck, and likewise to recomfort with muck, put to the roots; but to water it, with muck-water, which is like to be more forcible, is not practised."—BACON.

LOWELL:
DANIEL BIXBY.
1842.

TO THE
CITIZENS OF LOWELL,
THESE PAGES, THE PITH OF EIGHT LECTURES ON THE
CHEMISTRY OF SOIL AND MANURE,
DELIVERED BY THEIR REQUEST,
ARE RESPECTFULLY INSCRIBED,
BY THE AUTHOR.

LOWELL, JAN. 1, 1842.

UNIVERSITY OF
CALIFORNIA

CHAPTER I.

GEOLOGY OF SOIL.

1. **AGRICULTURAL** Chemistry aims to explain all the actions of earth, air, and water, upon plants. It refers to all their chemical relations, to the geology, mineralogy and chemistry of soil.

2. Agricultural geology explains the relations which soil bears to plants, and the manner in which that affects vegetation.

3. Agricultural geology confines itself to facts. It digs into the earth, observes what composes that ; how its components act upon plants. Conversant only with facts, or logical deductions from these, it leaves to geology proper, the vast mass of observations, supported by the highest modern science, which teaches the origin, mode of formation, original condition, and successive changes which our globe has undergone.

4. The terms, primitive and secondary, used by geologists, are almost parts of common language ; yet, need to be explained to the farmer.

5. A large tract of any extensive country is composed of rocks of a granite texture. This needs no definition. Such rocks having been observed to underlay all others, in the scale of rocks composing the earth's crust, were called primary. It was supposed that these were first formed. Out of the ruins of these, no matter when or how ruined, other rocks have been made, called secondary. The ruins of the primitive rocks have been transported by water, and then gradually deposited layer upon layer. Under immense pressure, these layers of mud, sand, fine gravel, rolled stones, &c., have been, hardened into solid rock; forming sandstones, slates, or even rocks presenting the crystalline structure, or texture of granite, by the action of heat, which the facts of modern geology teach, exists in the interior of our globe.

6. This central heat is supposed to be the cause of volcanoes, and the primitive rocks themselves, to have been the ejection, under circumstances unknown, of the melted mass of the globe; ejections, similar in kind, to those of modern lava, but greater in degree.

7. Intermediate between modern lava, and primitive rocks, and actually passing into either, is a large class of ancient volcanic rocks, called, trappe-

an; such are basalt, trap, and highly crystalline porphyry.

8. However named and classed are the rocks of the earth's surface, they have one common origin, the molten matter of the globe. Hence, having a common origin, their ultimate chemical constituents are similar. If granitic rocks have a certain chemical constitution, then sandstone, slate, &c., having been formed from worn out and worn down granitic rocks, have a constitution chemically like them.

9. To the agriculturist, the terms *primary* and *secondary*, are useless. Equally so are all distinctions of soil based on these terms.

10. Soil is the loose material covering rocks, and often is included in that term. Both are to be classed by their origin. The origin of rocks refers not only to the mode of their first formation, but to their subsequent arrangement. The origin of all rocks, geology teaches, is from the molten matter of the globe. These have been, afterwards, in some cases, removed by water, and in part re-modified by heat [5]. Referring rocks to their origin, they are divisible into two great classes.

1st. Those formed by fire.

2d. Those formed by water.

11. This division relates both to the origin and

distribution. In their origin all rocks are truly *igneous* or by fire. In their distribution they are *aqueous* or by water. This is the only division necessary to the farmer. It is the division taught and demanded by Agricultural Geology.

12. The first class includes all the highly crystalline rocks, granite, gneiss, sienite, greenstone, porphyry; basalt, lava, volcanic sand. The products of volcanoes, whether ancient or modern, agricultural geology places in the same class, including thus all that portion which forms the largest part of the earth's surface.

13. The second class includes sand, clay, gravel, rounded and rolled stones of all sizes, puddingstone, conglomerates, sandstones, slates. When these various substances are examined, a large part of sand is found to be composed essentially of the ingredients of the igneous rocks. This is true also, of sandstone, slate, of conglomerates, of boulders.

14. There is a large deposit, or formation in some districts, composed almost wholly of one of the chemical constituents of the igneous rocks, united to air. The constituent is lime, the air is carbonic acid, forming by their union carbonate of lime. Marble, limestone, chalk, belong to this formation. These are not to be ranked as original igneous pro-

ducts, subsequently distributed by water. The lime, originally a part of igneous rocks—has been separated and combined with air, by animals or plants, by a living process, called secretion. The modern production of carbonate of lime, is still going on under the forms of shells and corals. Though belonging to neither division, the subject will be simplified by referring limestone to the second class of rocks—but it is truly a salt, and belongs to neither division and it will be discussed hereafter.

15. The chemical constitution of all rocks is similar. If rocks are divided into two classes, the first composed of the highly crystalline, usually called primary, such as granite, gneiss, mica slate, porphyry; and the second class, composed of rocks, usually called trappean, as basalt, greenstone, trap, then the great difference in their chemical constitution is this :

The first class, or granitic rocks, contain about 20 per cent. more of silex, and from 3 to 7 per cent. less of lime and magnesia and iron, than the second or trappean class.

16. If the language of geology is borrowed, and rocks which present the appearance of layers, or a "stratified structure," are divided into two classes, fossiliferous and non-fossiliferous, or those which do, or do