DISCUSSION AND CORRESPONDENCE

"DENUDATION," "EROSION," "CORROSION" AND "CORRASION"

The recent article by Professor M. H. Bissell[1] on the use of the terms "denudation," "erosion," "corrosion" and "corrasion" expresses a need which is felt by most instructors of elementary classes in geology and physiography. In the opinion of the writer the confusion of terms is attendant on a confusion of ideas concerning three very essential topics discussed in any elementary class, namely, weathering, denudation, and deposition.

The geologic agents of denudation and deposition are practically identical. Hence it is logical to discuss the denudational and depositional work of the wind, running water, underground water, the ocean, ice, and gravity. It seems to the writer, however, that the practise of placing a discussion of weathering in a chapter entitled "The work of the atmosphere" is very confusing. The agents of weathering are quite distinct from those of denudation and deposition, and require separate treatment. It is very difficult to show the connection between the work of the atmosphere and exfoliation. It is poor physics to teach that the expansion and contraction of rocks is due to the atmosphere.

The writer would define weathering as the alteration of rocks rendering them liable to transportation by the dynamic forces having their origin near the surface of the earth. Wind, water, ice, and gravity can not transport bed-rock. But when bed-rock is broken down by the chemical and mechanical activity of weathering, its particles may be transported.

In a similar way, denudation might be defined as the removal of the products of rock weathering by the dynamic forces having their origin near the earth's surface. The process involves the lowering of the earth's surface by the combined actions of erosion and transportation. Erosion may be subdivided into two processes: (1) the mechanical wearing away of rocks (abrasion) by wind, running water, ice, and gravity; and (2) the chemical loss (corrosion) due to agents present in passing streams of water and air. The central idea expressed by the term "denudation" should involve the erosion and transportation of rock debris from its source to a position below baselevel.

The word "corrasion" appears to be so similar in usage to the term "erosion" that it should be discarded in favor of the commoner term.

The writer believes that the average geologist has not departed very far from the root significance of the terms discussed by Professor Bissell. The development of the term "weathering," however, has outrun its original meaning, and processes are included which are not connected with atmospheric action.

A diagrammatic outline for class discussion of these topics might be the following.

- Weathering.
  - Water.
    - Mechanical (frost)
    - Chemical (hydration, oxidation, etc.)
  - Heat and cold, mechanical (exfoliation)
  - Atmospheric gases, chemical (oxidation, carbonization, etc.)
  - Plants
    - Mechanical (root growth)
    - Chemical (acids from roots and decay)
  - Animals.
    - Mechanical (digging, burrowing)
    - Chemical (acids from decay and excreta)
- Denudation and Deposition...
  - Wind: Erosion, transportation, deposition
  - Running Water: Erosion, transportation, deposition
  - Underground Water: Erosion, transportation, deposition
  - Ice: Erosion, transportation, deposition
  - Gravity: Erosion, transportation, deposition

It may appear that the chemical activity of water in weathering, and of running water in denudation, are one and the same thing, but it

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would appear to the writer that a distinction can be drawn between the static agent on the one hand, and the moving agent on the other.

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A POSSIBLE FACTOR IN THE INCREASING INCIDENCE OF GOITER

IN my surveys of industrial hygiene I have noted that at some of the salt works in Ohio, where the material is obtained from deep wells (which in pioneer days were widely known springs, and the gathering points of men and animals), bromine, and a trace of iodine, are separated out of the purified product, sodium chloride, and bromine sold as a by-product. I suspect that in inland countries, Nature's chief source of iodine has been in connection with these salt springs, wells, and "licks," and that perhaps this change to a deep source of salt and this purification has resulted in the quite complete absence of iodine from our daily condiment when obtained from inland manufacturers, that is, in package or carton through the avenues of commerce.

It is well known that sea salt, some sea foods, and sea growths contain iodine. Also there is only a limited amount of goiter among dwellers along the seas. Furthermore, in former times a considerable part of the salt used has been sea salt, simply crystallized, and not necessarily pure sodium chloride separated from the other halogen salts.

At first this theory does not seem plausible in connection with the historical incidence of goiter, cretinism, and other manifestations of hypo-thyroidism, noted in the Alps and associated mountain regions, wherein are located some of the largest salt mines in the world. However, Molinari in his "Inorganic Chemistry," as translated by Dr. Ernest Fielmann (1912), takes occasion to explain that while these great salt beds were originally naturally deposited from sea waters, they have had the composition of the deposits very materially changed during the ages, through the varying solubilities of the halogen compounds (sodium iodide being particularly soluble and therefore among the first to be washed out through the influence of percolating waters). Hence perhaps inhabitants of these regions, getting their salt from these localities, have been bereft of the associated iodine component so essential to the human economy.

As is well known, Marine and Kimball published remarkable effects of the administration of a few grains of sodium iodide several times a year to school children as a prophylaxis in goiter.[1] After communication with two or three authorities I am convinced that this suggestion concerning goiter has not been heretofore considered. Also in an investigation of literature at hand, I have been unable to find that any consideration has been given to the influence of a condiment composed of whole sea salts upon goitrous conditions. Should any one be so informed, I shall be pleased to hear from him, inasmuch as I have determined to spend a little time this summer in investigating the subject from the industrial end.

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THE SOCIAL ASPECTS OF COUNTRY PLANNING

FOLLOWING in the wake of city planning now comes country planning. As the face of the country differs from the face of the city, so country planning in some respects will differ from city planning. The social aspects of the planning idea as applied to country living conditions, are so important that a study of these aspects should rank as a sociological contribution of the first order.

Such a study is under way in the Division of Farm Life Studies, Office of Farm Management and Farm Economics, U. S. Department of Agriculture. The first step in the study is finding out the location of a few of the best instances or examples of outdoor country art and country planning in the United States—especially instances arising from the initiative of farm or village populations. The next step is to obtain a description and history of each from the person who has been connected with, or has close personal

[1] *Jour. Amer. Med. Assoc.*, Vol. 71, No. 26, pp. 2155, Dec., 1918.