forepaws whilst peering at the intruder. In E. T. Seton's "Life-histories of Northern Animals," the story is repeated from Coues, but in the index the entry is credited to J. G. Lockhart. In the Encyclopædia Americana, the only J. G. Lockhart is the biographer of Sir Walter Scott.

Is it possible to get a line on this "Mr. Lockhart" who saw the wolverene on two occasions shading its eyes with a paw?

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JONATHAN EDWARDS AS A FREUDIAN

SINCE Jonathan Edwards has been brought forward as a precursor of Einstein, I wish to file a claim in his behalf as a pre-Freud Freudian. In that very remarkable record of autoanalysis, his Diary, he notes under date of May 2, 1722:

I think it a very good way to examine dreams every morning when I awake; what are the nature, circumstances, principles and ends of my imaginary actions and passions in them; in order to discern what are my prevailing inclinations, etc.

Not only did Edwards use dream analysis for the discovery of his secret sins, but he also employed the Freudian therapeutics of frank self-examination starting with random reverie and following the thread of association until he reached the complex that he desired to eradicate by confession and sublimation. For instance, the entry dated "Saturday August 10, about sunset," reads:

As a help against that inward shameful hypocrisy, to confess frankly to myself all which I find in myself, either infirmity or sin; also to confess to God and open the whole case to him, when it is what concerns religion, and humbly and earnestly implore of him the help that is needed; not in the least to endeavor to smother over what is in my heart but to bring it all out to God and my conscience. By this means I may arrive at a greater knowledge of my own heart.

When I find difficulty in finding a subject of religious meditation in vacancies, to pitch at random on what alights in my thoughts, and to go from that to other things which that should bring into my mind, and follow this progression as a clue, till I come to what I can mediate on with profit and attention and then to follow that.

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SCIENTIFIC BOOKS

Plant Indicators. The Relation of Plant Communities to Process and Practise. By FREDERC E. CLEMENTS. 388 pages, 92 plates. Publication 290 of the Carnegie Institution of Washington, Washington, D. C.

This is a companion volume to Dr. Clements's book on Plant Succession.[1] The aim of the present work is to show the value of the natural vegetation as indicating climatic and soil conditions, and hence, indirectly, the suitability of the areas covered for agriculture, grazing and forestry.

The earlier literature is briefly reviewed, with especial emphasis upon publications which have appeared since the plant indicator concept became definitely established (Hilgard, 1860, Chamberlin, 1877), and especially since quantitative methods began to be employed in the study of vegetation. The indicator concept is discussed on pages 28–34, stress being laid upon the superiority of the plant community to any single species. The author's point of view is illustrated by the following quotations:

As is shown later, plants may indicate conditions, processes, or uses. The simplest of these is the first, the most practical is the last. The plant may indicate a particular soil or climate, or some limiting or controlling factor in either. This would seem to be axiomatic, but it is well known that grassland, which is typically a climatic indicator, often occupies extensive areas in forest climates. Thus, the presence of a plant, even when dominant, is only suggestive of its meaning. It is necessary to correlate it with the existing factors and, better still, to check this correlation by experimental planting, or an actual tracing of the successional development.

Indicators of processes usually require a double correlation, namely, that of the plant with the controlling factor, and that of the factor with the causal process, such as erosion, disturbance, fire,

[1] Clements, F. E., "Plant Succession," Publication 242, Carnegie Institution of Washington, 1916.

etc. . . . In the case of use or practise indicators, the sequence differs in accordance with the nature of the crop. When the crop is a natural one as in grazing, the sequence is simple and direct. . . . With forage and grain crops, the sequence is more complex, partly because the species concerned are not native, but largely because the physical conditions are unnatural as well as controlled. . . .

. . . . . .

. . . It is necessary to recognize that every dominant can be used as an indicator of past and future as well as of present conditions. This is due, of course, to the fact that every dominant or subdominant has a definite position in succession. . . .

Bases and criteria are treated (pages 35–75) under the following main headings: The Physical Basis, The Physiological Basis, The Associational Basis, The Successional Basis, Indicator Criteria, Life-forms, Habitat-forms, Growth-forms, and Communities as Indicators.

The third chapter (pages 76–104) deals with the kinds of indicators, which are classified as Factor Indicators, Process Indicators and Practise Indicators. Among the factors considered are water, light, temperature and solutes. In this connection, the author considers lack of oxygen as the most important factor affecting plant growth in acid soils. Discussing climatic and edaphic (soil) indicators, it is stated:

The local or edaphic conditions find their expression in the seral dominants and subdominants, and the communities which they constitute. The widespread climatic conditions are reflected in the climax formation, associations, and societies.

Process indicators belong to successional rather than to climax associations and indicate the effects of disturbances of the habitat, either "natural" or brought about by the agency of man. Practise indicators show whether the land is suitable for agriculture, grazing, or forestry, and with less certainty, to what kinds of crop and methods of production it is best adapted.

A large part of the book (pages 105–236) is devoted to descriptions of the climax formations of western North America, comprising the various associations of grassland, scrubland or chaparral and forest.

Agricultural indicators are discussed on pages 237–269. Here the author develops his ideas as to the classification of the remaining public land on an indicator plant basis, stating:

. . . it should become a cardinal principle of land classification to rate as grazing or forest land all areas in which it is impossible to produce an average crop three years out of four. This would insure an adequate and permanent development of agriculture wherever possible and would warrant the introduction of scientific and economic systems of grazing, which would change it from a game of chance into an industry.

The subject of grazing indicators is treated at greater length (pages 270–335), the author pointing out that, "the simplest and most obvious indication of a plant community is that which denotes the possibility of grazing." In regard to the carrying capacity of range land, it is stated:

With respect to the plant cover alone, the carrying capacity of a grazing type is summed up in the total amount of the annual crop of forage, but the total yield must be interpreted in terms of value and utilization. Hence, it is necessary to take into account the composition of the type, the palatability and nutritive value of the dominants and subdominants, the duration and timeliness of the grazing season, and the effects of the climax cycle.

Forest indicators are discussed on pages 336–363, and the book closes with an extensive bibliography.

Field investigations extending over many years and covering practically the whole of the western United States have fitted Dr. Clements to deal with his topic in a comprehensive and illuminating manner. The philosophical point of view is predominant throughout the work, and the relation of the subject to other branches of science, as well as to practical affairs, is convincingly presented. The care used in preparing this handsome volume and its numerous excellent illustrations deserves high commendation.

Thomas H. Kearney