

Prologue

by

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This is the second of a series of annual symposia aimed at well-informed layman rather than at specialists in the field. These symposia are being arranged by subcommittees of the Committee on Arid Zone Research of the Southwestern and Rocky Mountain Division of The American Association for the Advancement of Science. The first of the series, held at Tucson in 1957, presented papers on *Climate and Man in the Southwest*. The present group of papers deals with another phase of ecology—of the region. Logically, of course, discussions of various phases of human ecology; of agriculture, and of the relation of natural vegetation to stream flow in arid and semiarid areas should be included; but these have been reserved for later, special symposia in the series, and the present papers deal with the ecology of plants and of animals lower than man. And, since the vegetation and the soils cannot be separated without doing violence to both, a paper on the soils of the region is included.

With the population of the world increasing at its present frightening rate, and with a third of the land surface of the world encompassed in the arid zones, it is inevitable that these areas will be pressed more and more into use. If this use is to be sustained, it must conform to sound ecological principles—leaving aside the ecological unsoundness, which will be mentioned more fully by Dr. Cowles, of the population increase. That much of our use in the past, even under low population pressure, has not been ecologically sound is attested by shrub-invaded upland ranges and gutted valleys through which course sediment laden, ephemeral streams. Accounts of a hundred years ago and less describe many of these upland sites as expanses of fine grassland and some of the streams as untrrenched and with clear water supporting fish. It would appear, then, that it is time for all of us—specialist and layman, alike—to begin to think in terms of sound ecological principles, if we are to make wise and efficient use of our arid lands. It is the hope of the Committee on Arid Zone Research that this symposium and the others of the series may contribute to this sort of thinking.

AAAS Sym. 2, "Bioecology of the Arid & Semiarid Lands of the SW", NM Highlands Univ. Bul. 1961.

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As stated in the prologue, the papers of this symposium are concerned with phases of the ecology of plants and animals in the arid and semiarid portions of the Southwestern United States. In his paper on the soils of the region, Mr. Fletcher has pointed out the close relationship of soil zones to those of climate, and he intimated, at least, that the correlation extends to the vegetation as well. This is not surprising, of course, since it is generally recognized by ecologists and soils specialists alike that climax vegetation is determined by the climate and that mature soils are strongly influenced by the climate and vegetation under which they develop.

Mr. Fletcher mentions the Thornthwaite-Precipitation-Evaporation Index, the Crop-Moisture Index of Maker and Dregne, and one or two other indices that have been devised to characterize the climate quantitatively. He calls attention to rather wide discrepancies between the soils and vegetation of different localities with similar or identical index values, thus emphasizing the fact that the vegetation and the soils are more precise indicators of climate than any mathematical index yet devised. This is rather strikingly illustrated by the map of Maker and Dregne (1951), who depict climatic zones of New Mexico on the basis of their refinement of the Thornthwaite P-E Index, the Crop-Moisture Index. In their Zone 7, they include an area in the San Juan Basin of northwestern New Mexico with areas in the southern part of the state including the Rio Grande Valley and the Otero Basin. The grasses characterizing the northwestern area are blue grama, galleta grass, and western wheatgrass, which require better moisture conditions than do the black grama and tabosa grass that are characteristic of the southern areas included in the zone. The shrubs that invade the grassland of the northern area are big sagebrush and species of rabbit brush; whereas in the south they are mesquite, tarbush, and creosotebush. As shown by Mr. Fletcher's map, the areas differ in their soils also.

In her discussion of structural characteristics of plants found growing in dry habitats, Dr. Shields points out—what may be surprising to some—that many of these plants lack structural modifications that conserve water. In fact, some modifications, such as reduced leaf size, copious epidermal hairs, etc., which might be expected to do so, may not only fail to reduce the loss of water, but may actually augment it. Some morphological responses, however, such as certain protoplasmic changes and increased root development, may contribute to more efficient use of what soil moisture is available.