

THE MYTH OF COMMUNITY AS ORGANISM

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The traditions of natural philosophy, natural history, and one of their successors, ecology, converge on a concept of nature having the properties of an organism or, as it came to be called, a supra- or superorganism. This tradition was surveyed by Haraway, who traced it to Aristotle [1]. The extension of biological organicism to the social group, single species, or community was accomplished in the 19th century, and protoecologists and ecologists applied the metaphor of organism to the entire complex of organisms, the multispecies community, or even to organisms and environment, the ecosystem [2]. For example, Karl Semper characterized species as related "like the organs of a healthy living organism," while the pioneer ecologist-limnologist, Stephen A. Forbes, wrote: "A group or association of animals or plants is like a single organism" [3, 4]. Clements and Shelford described the organismic concept in ecology as "a veritable magna carta for future progress," and the major treatise on animal ecology of the first half of the 20th century stated: "The interspecific system has also evolved the characteristics of the organism and may thus be called an ecological supraorganism" [5, 6]. F.S. Bodenheimer declared that "every modern textbook of ecology stresses the highly integrated supraorganismic structure of communities," and he traced the notion's empirical sources in ecology and its epistemological sources in philosophy, notably Immanuel Kant and Bertrand Russell [7]. The dominance of the supraorganism concept of community in ecology was essentially uncontested before 1950, in spite of a few lonely voices opposing it—including Bodenheimer, who stated that whatever its merits as a heuristic device, there was no scientific evidence to support it.

The concept of the organismic community was most explicitly and effectively advanced in ecology by the plant ecologist Frederic Clements [8]. Clements described vegetation as composed of "climax" communities rec-

ognizable by characteristic dominant species, each occupying an extensive area of similar or identical climate: "Thus like other but simpler organisms, each climax has its own growth and development, . . . A formation arises, grows, matures, and finally dies. The formation, moreover is able to reproduce itself" [9]. Clements visualized the landscape of America as largely covered by stable, deterministic regions of climax vegetation until the advent of civilization in the form of European agriculture, which, he claimed, made recognition of distinct boundaries difficult.

Although some ecologists demurred, it was not until the 1920s that an alternative paradigm of community appeared, in the work of L.G. Ramensky in Russia and H.A. Gleason in the United States. Gleason's "individualistic concept"—which was ignored when it first appeared in 1917, attacked on its second appearance in 1926, doubted at its third appearance in 1939, and then largely ignored by ecologists—was specifically developed as an alternative to Clements' organismic concept of community [10]. Gleason's thought was based on three premises: (1) each species responded to the environment individually; (2) the environment varies continuously in time and space; and (3) dispersal of organisms from place to place is stochastic. Hence the community at any site was individualistic, differing from the community at other sites. The contrasting metaphors were "predictable," "integrated," "unit," and "organism" for Clements' idea, and "coincidence," "spectrum," "continuum," and "gradient" for Gleason's. These largely qualitative models remained as conceptual alternatives, with Clements' climax model in ascendance, until the 1950s, in spite of the doubts of some ecologists.

Michael Barbour wrote that "something profoundly important happened among American ecologists during the decade of the 1950s" [11]. What happened was that Gleason's "individualistic concept" was resurrected in ecology as an alternative to the traditional organismic concept of the community. The "fragmentation" Barbour noted beginning in the 1950s led to extended, even heated, discussion of the attributes of community [12–14]. Although some ecologists had not accepted Clementsian theory before 1950, because there was no alternative concept, hypothesis, or even paradigm, the discourse had been muted. Many discussions from the 1950s to the 1990s turned on the distinctions between a community as an organism or superorganism versus an individualistic community. These discussions were stimulated by extended quantitative studies of communities from diverse habitats—marine, freshwater, and terrestrial—and many taxonomic groups of animals and plants. The empirical evidence was the concurrence, or not, of species and their pattern of distribution in space, such as along a topographic gradient up a mountain slope, or along a gradient of an environmental variable such as dry to wet soils. According to the organismic tradition—or what came to be called the community unit theory—species should respond as integrated groups reaching their peak pop-

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ulations at similar points on the gradient and having coincident boundaries. In the individualistic concept, species populations were represented as peaking separately along the gradient, and boundaries were similarly scattered. The interpretation of data became more problematical with the increasing use of quantitative measurements and the advent of multidimensional mathematical models. Nevertheless, the debate continued with the classical Clements/Gleason poles filled in with a variety of alternative models [15-17].

A corollary of the organismic concept of community was that the climax community responded as a unit to changes in climate. The classical interpretation was that the "zoned climaxes" retreated southward in front of advancing Pleistocene glaciers, returning north as the glaciers retreated and the climate ameliorated. Clements and Cheney described the southern border of the beech-maple climax retreating from the Ohio River to the Gulf of Mexico during maximum glacial stages [18]. Paleocological studies during the 1960s and 1970s, however, showed that species of a putative climax migrated separately to diverse places during the advances of Pleistocene glaciers and reassembled as different combinations in the areas freed from ice in the postglacial period [19]. This independent movement of species in response to climatic change was taken as support for the individualistic concept of plant and animal communities [20].

As might be expected, a superorganism is difficult to kill, and it has demonstrated its "resilience" in a number of ways [21]. The superorganism has even on occasion been revived [22]. The debate among ecologists about the community as organism persists to the present. What is unusual is that the dispute has been taken up by non-ecologists, among them historians, philosophers, and writers about the environment. This is not entirely surprising, because the metaphor of organism applied to nature is familiar in historical, philosophical, and literary discourses and is linked to other terms, such as *holism* and *emergence*, which are commonly associated with the organismic community in ecological discussions. However, even after the name *ecology* became widely familiar in diverse contexts with the widespread recognition of the environmental crisis in the 1970s, reference to substantive ecological scientific issues was rare. The purpose of this essay is to examine references to the organismic/individualistic debate among ecologists, especially Frederic Clements and H.A. Gleason, in the context of diverse non-biological disciplines. The interpretations of this long-term dispute about the ecological community turn on the powerful myth of nature as an organism.

The diversity of positions among ecologists should suggest caution to non-ecologists seeking justification from ecology. It is not that ecology has nothing to contribute to the interests of historians, philosophers, theologians, and environmental thinkers, but the various positions among ecologists must be considered. Ecology is a scientific way of examining the attri-

butes of nature defined by the presence and activities of living organisms in all their complexity. Recognition of this complexity has led ecologists into the depths of the mathematical theories of information, systems, chaos, catastrophe, and complexity, which have been explored in an effort to address the difficulties with which ecologists have struggled for decades. It is flattering to the ecologist's ego that ecology has been seized on as a source of enlightenment by writers in a variety of fields. However, it has been rather a selective process. The myriad terms using the prefix *eco-* or the adjective *ecological* commonly bear little relation to the science of ecology, and the interpretations do not necessarily follow from the evidence of ecology [23].

The first historian to refer to ecology, James A. Malin, identified three groups of ecologists: a Clementsian organismic group, the explicitly opposed Gleasonian individualistic group, and an intermediate group [24]. Malin cited Gleason and considered his individualistic concept in detail at a time when texts and references in ecology largely ignored him. Malin's analysis of these contrasting views appears, significantly, not in the two chapters he entitled "Ecology," but in a later chapter on "Science and Social Theory." Malin vigorously attacked Frederic Clements' role as consultant to the U.S. Department of Agriculture during the 1930s drought and the social consequences of his ideas for management of the American grassland, based on his organismic theory of climax community. Clements envisioned the development of the American grasslands in terms of his theory of the climax community, which established the proper ecological system for the development of the Great Plains. He enunciated the traditional litany of organismic ecology: "Within such a huge organism, the whole is much greater than the mere sum of its parts and hence the need for coordination and correlation far transcends all other considerations whatsoever" [18].

In Malin's view, the Clementsian "climax as a general condition, extending with any degree of uniformity over a large area, is quite out of line with reality"; Clements' concept of vegetation as organism leading to climax carried, Malin said, "something of teleology" [24]. Swieringa quoted Malin contra Clements: "it is essential to avoid . . . any form of geographical determinism, of holism or gestalt dicta about the whole being greater than the sum of its parts" [25]. Malin was explicitly pro-Gleason, writing that species were individualistic in their response to the physical environment and other species and that "Under no circumstances did an association migrate or reproduce as a unit" [24]. Such "down-to-earth realism" excluded completely any idea of vegetation units as organism" [24]. Malin distrusted the organismic concept as "collectivistic" and lending "support to the authoritarian state" [24]. Gleason's individualistic concept was more in keeping with his own ideas about the role of the individual agriculturalist in developing the grasslands contra Clements' intimations of government

