

Chapter 23

Plant Community, Plantesamfund

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The First Use of the Plant Community Concept

The plant community concept was first introduced by the Danish botanist Johannes Eugenius Bülow Warming (1841–1924) in his book “Plantesamfund” of 1895, where he suggested a general theory of explaining different geographical distributions of plants. The title “Plantesamfund” can be translated both as Plant societies and Plant communities, since the Danish word samfund means both “society” and “community” (or alternatively “Gesellschaft” and “Gemeinschaft” in German). To keep the broad meaning of the original title Warming chose the German title “Ökologischen Pflanzengeographie” (1896) and the English title “Oecology of Plants” (1909). The book addressed different factors limiting the geographical distribution of different plants. He used the concept of “community” or “Gemeinschaft” when describing smaller geographical distributions of plants, while “oecologie” or “Ökologie” had a broader geographical meaning corresponding to “society” or “Gesellschaft” as a whole. “Plantesamfund” was not translated into French, though Warming was inspired by the French botanical notion of “le commensal” (dinner partner) in his thinking about the plant community. “Plantesamfund” was also translated into Polish in 1900 and Russian in 1901.

Summary

The Danish botanist Warming coined the plant community concept in his book “Plantesamfund” in 1895. It has a neo-Lamarckian, morphological, and religiously informed understanding of plant geography. The community concept also drew its inspiration from the Danish political and social environment. Warming was a patri-

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otic defender of the King's council's ambition to expand the Danish Empire and the exploitation of natural resources. The plant community concept provided a tool for management of nature that was inspired by the King's steering of human communities. Warming's morphologically informed research in Brazil and his geographical explorations of Greenland were also of key importance in the development of his plant community concept.

Main Phases of the History of the Concept

The plant community concept was first introduced in Danish. The English translation of 1909 is true to the original Danish definition:

The term 'community' implies a diversity but at the same time a certain organized uniformity in the units. The units are the many individual plants that occur in every community, whether this be a beech-forest, a meadow, or a heath. Uniformity is established when certain atmospheric, terrestrial, and any of the other factors discussed in Section I [light, heat, humidity, air, nutrients, soil, water, etc.] are co-operating, and appears either because a certain, defined economy makes its impress on the community as a whole, or because a number of different growth-forms are combined to form a single aggregate which has a definite and constant guise. (Warming 1909, p. 91).

The plant community concept emerged from Warming's research in the Brazilian community Lagoa Santa in the early 1860s, research which was published in his book of the same name in 1892. His voyage to Greenland in 1884 was also important to the plant community concept, since it was during this expedition that he learned to appreciate the importance of having a managerial overview on a geographical landscape before analyzing its plants. Warming's patriotic political views and support of the King's geographical ambitions for enlarging the Danish Empire were also of significance for his plant community concept. It was assumed that only a stable and harmonious human community could be a true resource for the nation. Plant communities, by analogy, Warming argued, could only be a natural resource in so far as they lived in commensalism with the rest of nature. He would quote the French botanist Pierre Joseph van Beneden's (1809–1894) definition of commensalism – “Le commensal est simplement un compagnon de table” (The dinner partner is simply a companion at the table) – to evoke the sense of mutually benefiting way of living he thought both humans and plants were striving for (Warming 1909, p. 92). This commensalism was to describe a symbiotic relationship where different plants could live side by side at the same dinner table without harming each other's living conditions. He was particularly interested in cases where certain plants may benefit from living in co-relationship with other plants.

Warming was widely read and appreciated among Danish and Scandinavian ecologists (Prytz 1984; Söderqvist 1986). German plant geographers, such as Andreas Franz Wilhelm Schimper (1856–1901), were also inspired by Warming, and altogether three different versions of “Plantensamfund” appeared in the German language (Schimper 1898; Goodland 1975).

In Britain Arthur George Tansley (1871–1955) pursued a mechanist informed reading of Warming's plant community concept, while his rival Isaac Bayley

Balfour (1853–1922) pursued a morphological interpretation that was more in accordance with Warming's original ideas. The South African ecologist and Balfour-student John Phillips (1899–1987) would coin the phrase “biotic community” in reference to Warming and to the holistic philosophy of the South African statesman Jan Christian Smuts (1870–1955). (Smuts 1926; Phillips 1931).

Warming showed little interest in epistemology and philosophy, but regarded himself instead as a strictly empiricist. He had a religiously informed understanding of both the human and the plant community, believing that God's goodness and purpose was an acting force in nature and human communities alike.

Historical Background

The plant community concept Warming developed grew out of his patriotic as well as deeply religious views. He was raised on a farm in conservative rural Nørup west of Velje. This landscape in Denmark was dominated by the Randbøl heath where Warming would spend his youth nurturing a passion for nature. His father was a priest who died when he was only three years old, and his religious views were mixed with a lifelong longing for his father. His mother's family consisted of wealthy shopkeepers, and Warming would eventually inherit a fortune that enabled him to pursue his high-society botanical interests. This he did from the age of eighteen at the University of Copenhagen, where he would read for general exams in natural history and botany between 1859 and 1862 (Christiansen 1924–1926, pp. 617–665, 776–806).

This was a tumultuous political and social period in Danish history. The imperial ambitions of the King's cabinet caused much tension with respect to control of the rebellious duchies of Nord Schleswig, Holstein, and Lauenburg. A bitter war to defend the region between 1848 and 1851 did not settle the conflict, which re-emerged in another war between 1863 and 1864 in which Prussia took control of the duchies. In the coming years it became the King's council's official policy to expand the Danish Empire as well as trying to reunite Denmark with the lost land. Warming was on a lifelong crusade for the cause. It is telling that his biographer describes the reunion of Nord Schleswig (now Sønderjylland) with Denmark in 1920 as “the most joyful event of his life” Christiansen (1924–1926, p. 780).

His religious beliefs were, like most of his fellow Danes, Lutheran protestant. Religion in Denmark was at the time a political matter. Though the throne provided citizens with religious freedom and the Church was declared independent of the State, the King's cabinet was in reality the head of Church. In this hierarchy the King's good will would secure the religious purpose and order of society, communities, and the use of natural resources. Warming was a religious patriot, which meant supporting the authority of the King, religious and social stability, and the Danish imperial ambitions. He saw the wisdom of the King's council in view of the larger purpose and goodness of all living things, a purpose which had its ultimate cause in the Creator. It was God who once started the evolution of the Creation, and the botanists could unveil His purpose in the successive development of the living

things towards a gradually better world. It was then up to the King's council to wisely use botanical knowledge to guide the use of natural resources. According to his neo-Lamarckian views, plants adapting to their environment and God's purpose and goodness was behind these processes in nature. Though Warming in the late 1870s adopted the Darwinian principles of evolution, he could not agree with the view that this evolution was accidental or without a deeper aim (Coleman 1986). This purpose in biological evolution as well as human history he understood in view of the King's council's ambition of expanding the Danish Empire to secure the wealth of the Danish nation through exploitation of natural resources.

In 1863, the same year the King's council decided to pursue their geographical objective of trying to take back their lost duchies with military might, Warming left for Brazil. He was invited to serve as a secretary for the palaeontologist Peter Wilhelm Lund (1801–1880) who was working on an excavation site in the community of Lagoa Santa. According to Warming, it was a place of “light and joy and peace” Christiansen (1924–1926, pp. 624). It was also a place of loneliness. Lund was a rather asocial person whose only demand of Warming was to read and organize his correspondence. This forced Warming to stay in proximity of their house, and thus to limit his own research to the immediate surroundings. Over the next two and a half years, he consequently came to know the geographical location of almost every plant in the neighbourhood. Upon his return he would use three decades to describe the fourteen cases of species he collected into a book he eventually published as “Lagoa Santa” in 1892.

Warming was an admirer of Alexander von Humboldt (1769–1859), who in his books about plant geography relied on morphological methods as well as systematic botany (Nicolson 1983, pp. 12–73). His chief source of inspiration, however, was neo-Lamarckism and the idea that plants adapt to each other and their respective environments. Upon his return from Brazil he would plunge into morphological-organic studies of plants. His colleagues in Denmark initially found Warming arrogant and disagreed with his ideas about the importance of environmental factors in understanding the geographical distribution of plants. After extensive travelling at various universities in Germany, he eventually settled for a professorship in Stockholm where he would lecture and write about systematic botany. These lectures resulted in a series of textbooks, which were widely used in Scandinavian universities and beyond. His “Haandbok i den systematiske botanik” (Handbook in Systematic Botany) from 1879 and “Den almindelige botanik” (The common botany) from 1880 were both reprinted in several editions as late as 1891 and 1895 respectively. When he finally received a professorship at the University of Copenhagen in 1886 he would lecture regularly for medical and pharmaceutical students, lectures that were published as “Grundtræk af forelesninger over systematisk botanik” (“Outlines of lectures in systematic botany”), in 1896.

What brought Warming back to Copenhagen and the inner circle of Danish scholars was the desire of the King's council to map and explore the natural resources within the Danish Empire, such as those of Greenland, Faeroe Islands, and eventually Iceland. These explorations started in the winter of 1884 with a voyage to investigate the botany of Greenland. The sparse vegetation in this arctic

landscape allowed Warming to achieve a swift and effective overview. The bare landscape gave him an opportunity to understand the geographical distribution of plants and see them in view of other plants and the entire habitat (Warming 1890). The possibility of seeing plant communities in relation to the ecological environment as a whole was an exciting turn in his research, and it became the methodology for organizing his Brazilian material published as “Lagoa Santa” in 1892. Botanical investigations into natural resources on contested Danish territory would occupy much of Warming’s later work, such as in “Botany of the Færöes” (1901–1908) and in “Botany of Iceland” (1912–1918). The aim of these investigations was to establish Danish hegemony in the territories and open up for exploitation of plant communities. This correlation between botany and resource management was not accidental; Warming and his students sought to develop an ecological method suitable for Danish social control in a foreign region (Christiansen 1924–1926, pp. 799–800, 806–832).

Most of Warming’s work prior to the Greenland expedition was morphological in content and systematic in outline. This research was widely respected among his fellow scholars, but it did not attract students’ attention beyond preparing for exams. What created excitement among the young was Warming’s introduction and development of the plant community and other ecological concepts. Throughout the 1890s, the plant community became a particularly central concept. It was to explain how plants could live and evolve together in “commensalism” without the dreadful struggle for existence described by Charles Darwin (1809–1882). Warming’s religious neo-Lamarckian views implied that plant communities were in stable harmony slowly progressing towards higher development. This mirrored the concept of community and progress in the Danish society.

The original Danish edition of “*Plantesamfund*” from 1895 was a short book meant to provide the reader with a sense of overview. The book grew with each translation, however, since Warming continuously added more details to substantiate his claims. The key terms and concepts, however, hardly changed in the new versions of the book. The German and English translations were thus conceptually similar, while the number of examples and elaborations grew with each volume. Most non-Danish scholars learned about the plant community concept through the widely read German translation of “*Plantesamfund*” by Emil Knoblauch which was published as “*Lehrbuch der ökologischen Pflanzengeographie*” in 1896. In Britain, Tansley, for example, thought that Warming “opened [...] a new way of looking at the plant world” (Tansley 1924, p. 54) and he adapted the German translation as a textbook for his own botany classes at the University College, London. The Central Committee for the Survey of British Vegetation (with Tansley as Chairman) would dedicate their famous “Types of British Vegetation” from 1911 to Warming as “the father of modern plant ecology.” It was the Edinburgh ecologist Balfour who arranged for the first English translation. Warming wrote a fully revised manuscript; he also upgraded the morphological content by leaning on the German versions. Balfour thus claimed in 1909 (with Warming as the authority and to Tansley’s annoyance), that that University of Edinburgh was the center for plant community and ecological research.

Henry C. Cowles (1869–1939) at University of Chicago was much pleased with the morphological turn of ecological methodology, while Tansley wrote a long critical review of the English edition, in which he advised his readers to stick to the first German version (Cowles 1909; Tansley 1909). The tension among British ecologists with regard to how to read Warming soon evolved into a major debate between the mechanist inspired ecology of Tansley and the holistic “biotic community” reading of Warming by Balfour’s student Phillips (Phillips 1931; Anker 2001). It was the ordering of plants by Warming according to geographical factors that intrigued Tansley. He was not against morphology as such when he first read Warming. The tension that developed between him and Balfour first became apparent when Tansley learned to appreciate genetic and biochemical research around 1901. Tansley now started to promote genetics and plant geography as the right ecological approach, while Balfour stuck to the morphological study of tracing the ancestral history of species as a methodological basis of ecology. Warming himself did not believe in the value of genetics, and the subsequent German editions of his book grew with a 600 page morphological enlargement in its final version of 1918. (Warming 1909, p. vi; Warming and Graebner 1918; Goodland 1975). Tansley would later renew his interest in Danish botany by studying the work of the Warming student Christen Raunkiaer (1860–1938), who over the years had elaborated on Warming’s plant community concept in the direction of functional classification in what he called “life-form-systems” of plants. Tansley initiated a translation of Raunkiaer’s collected papers to English, which appeared in 1934 (Raunkiaer 1934). Raunkiaer emphasized the importance of statistical methods in studying plant communities, something that caught Tansley’s attention while working out his own “ecosystem” concept (Tansley 1935).

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