

# Philosophy of Plant Morphology

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## *Summary*

I demonstrate how morphological research and our view of plant form is influenced by philosophical assumptions that are associated with worldviews and how empirical research may affect these assumptions and worldviews. I examine the following nine worldviews: essentialism, including phenomenology, mechanism, the fuzzy worldview (the continuum worldview), the dynamic worldview (also referred to as contextualism and process philosophy), holism or the holistic worldview (also called organicism), perspectivism (including complementarity), the generating-substance worldview, animism, and mysticism. All of these worldviews complement one another. However, essentialism and mechanism are more limited and the generating-substance worldview seems not tenable in terms of a material substance. All the remaining worldviews may be subsumed under a holodynamic worldview in the most comprehensive sense according to which plants and their morphology are integrated with the environment and the universe. Goethe embraced all of these nine worldviews. Characterizing him only as a phenomenologist and his method only or mainly as intuitive judgement (*anschauende Urteilskraft*), as it has been done so often, appears rather incomplete, one-sided, misleading, and a disservice to the “all-embracing Goethe” (*Cusset 1982*) who could recognize very different perspectives and could even go beyond them toward the mysterious ground of everything.

## *Zusammenfassung*

Es wird gezeigt wie morphologische Forschung und unsere Sicht der Pflanzenform beeinflusst werden durch philosophische Annahmen, die mit Weltanschauungen verbunden sind, und wie empirische Forschung diese Annahmen und Weltanschauungen beeinflussen kann. Die folgenden neun Weltanschauungen werden untersucht: Essentialismus, einschliesslich Phänomenologie, Mechanismus, die unscharfe Weltanschauung (Kontinuumsweltanschauung), die dynamische Weltanschauung (auch Kontextualismus und Prozessphilosophie genannt), die holistische Weltanschauung (Organizismus), Perspektivismus und Komplementarität, die Theorie einer schöpferischen Substanz, Animismus und Mystik. Alle diese Weltanschauungen ergänzen sich gegenseitig. Essentialismus und Mechanismus sind jedoch begrenzter, und die Weltsicht der erzeugenden Substanz scheint in Bezug auf eine materielle Substanz nicht haltbar zu sein. Alle verbleibenden Weltanschauungen können unter eine holodynamische Weltanschauung im umfassendsten Sinne subsumiert werden, wonach Pflanzen und ihre Morphologie in die Umwelt und das Universum integriert sind. Goethe lebte in allen neun Weltanschauungen. Ihn nur als Phänomenologen und seine Methode nur oder hauptsächlich als *anschauende Urteilskraft* zu verstehen, erscheint einseitig, unvollständig, und irreführend. Es wird dem «allumfassenden» Goethe nicht gerecht, der alle diese unterschiedlichen Perspektiven einnehmen und sogar darüber hinausgehen konnte.

Plants appear in myriad forms. Our perception and understanding of these forms (plant morphology) is influenced by philosophical assumptions and associated worldviews that are more or less projected into the manifoldness of plant form. Furthermore, our empirical investigations of plant forms may affect the philosophical assumptions and worldviews. Thus, the philosophy of plant morphology deals with the interrelations of philosophy and the empirical study of plant form (e.g., *Arber* 1950, 1954).

Worldviews can be conceptualized in different ways and consequently different worldviews and different numbers of worldviews can be distinguished. In this article, I shall examine the following nine worldviews: essentialism (including phenomenology), mechanism, the fuzzy worldview (the continuum view), the dynamic worldview (also called contextualism and process philosophy), the holistic worldview or holism (also referred to as organicism), perspectivism (including complementarity), the generating-substance worldview, animism, and mysticism.

### *Essentialism (including Phenomenology)*

According to essentialism and phenomenology (that implies essentialism) the world, including plant morphology, is a manifestation of essences, ideas or ideal forms. Most plant morphologists don't talk about essences explicitly, but they often use mutually exclusive categories that may imply essences such as root, stem (caulome), and leaf (phyllome). Then the whole morphological diversity is forced into these categories. This becomes obvious when a structure is encountered that does not fit. Even in that case the question is asked: Does it belong to this or that category? Which may mean: Is it essentially this or that? For example, for hundreds of years, essentialist morphologists have asked whether phylloclades are shoot or leaf homologues, whether they are essentially shoots or leaves (see *Cooney-Sovetts & Sattler* 1987).

I think that essentialism has been the most influential worldview in plant morphology. In the 20<sup>th</sup> century, essentialist morphology has been spread to a great extent by Wilhelm Troll (1897–1978) and Donald R. Kaplan (1938–2007) who had many students who in turn had many students. Troll acknowledged explicitly the essentialist philosophical foundation of his morphological work. Kaplan adopted an evolutionary approach, but he kept asking the same either/or questions an essentialist would ask. Troll was deeply influenced by Goethe's morphology (*Goethe* 1790, 1817–1824). To a great extent Goethe's morphology can be considered essentialist when he emphasized the essential similarity or sameness of all lateral appendages by pointing out that in all their manifold manifestations they remain always one and the same organ, "ein und dasselbe Organ" (*Goethe* 1817,