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The Phenomenology of Betweenness

Encountering Nature's Wholeness

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When something has acquired a form, it metamorphoses immediately to a new one. If we wish to arrive at some living perception of nature, we ourselves must remain as quick and flexible as nature and follow the example she gives.

—J. W. von Goethe (quoted in Miller 1988, p. 64)

Whether we observe a natural phenomenon on a relative micro-scale (e.g., a sprouting spring flower) or on a macro-scale (e.g., an oak forest through the seasons), it is evident that transformation underlies all things. While many transformations are gradual and imperceptible—consider the growth of a pine tree—many others are abrupt and even startling, such as a butterfly emerging from its chrysalis. Underlying these disparate examples is the recognition that change takes place in a temporal dimension—i.e., change occurs over various time spans.

We can, however, extend our observations to an apparently stationary object, say a wildflower on the edge of a trail, and ask whether there is evidence of change across a spatial dimension. In other words, does the organism, in the moment, offer us a picture of transformation among its various parts and structures?

Furthermore, if we gaze, for example, into a tide pool, and we note the differently shaped shells of the various snail species, we can ask: What is it that changes from one form to another? What form elements shift (e.g., height of spire, number of whorls, number and distinctiveness of ribs) and to what degree do they change?

As I hope to show, these are not idle questions but necessary first steps of a phenomenological method that can lead us to a cognitive experience of wholeness expressed within and among living organisms.

The pioneer of the particular phenomenological path I outline here is the influential poet, playwright, and naturalist J. W. von Goethe (1749–1832), who developed a way of science centered on keen, penetrating observation (Amrine et al. 1987; Seamon and Zajonc 1998; Bortoft 1996, 2012; Holdrege 2013; Riegner 2013).

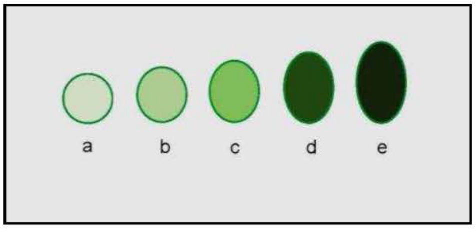
Here, I do not explicate the epistemological underpinnings of the breadth and depth of Goethe's contribution. Rather, I focus on a central aspect of Goethean phenomenology: the notion of metamorphosis. As expressed in the opening epigraph, Goethe saw all phenomena as transitory—momentary manifestations moving from a past toward a future.

Be they clouds, rivers, plants, animals, or the observer, all phenomena are embedded in an ongoing process of metamorphosis. Furthermore, by carefully attending to the metamorphosis of the phenomenon at hand, the observer can be led into a cognitive experience of the wholeness of the phenomenon.

In this essay, I attempt to lead the reader toward this cognitive experience or, at the very least, to offer an explanation of what this experience may entail.

Before we look at natural phenomena, it may be instructive to begin with a geometric example (***fig. 1***, below). As we glance at the shapes from left to right (or from right to left), note that shape and size change in an orderly manner. Furthermore, the shading changes in a stepwise fashion. Several features appear to be correlated and accordingly change in concert.

If the shapes were cut out and reordered randomly, a student would have little problem arranging them in the original orderly progression. One would also be able easily to draw an intermediate oval shape that could logically "fit" between any two shapes in the series, say between ***d*** and ***e***. This is possible because we readily grasp the context that gives meaning to the order of the shapes—and is itself accessed *through* the shapes. That context then informs our ability to draw a "missing" shape. Moreover, rather than seeing the shapes as isolated phenomena juxtaposed in space, we instinctively see them as steps in a developmental process, frozen moments in a continuum.



How many missing shapes are there? Clearly, as a property of a continuum, there exists an infinite number of missing or, better, *potential* shapes in the sequence. In fact, between any two shapes, there exists an infinite number of potential shapes. There are, however, limits to the infinite number of potential shapes because not any random shape will do. Like hearing a wrong note played in a melody, we would immediately notice an incorrect shape misplaced in the sequence.

One final point regarding this pictorial sequence: A distinguishing feature expressed through the relationship of the shapes to each other is that they exhibit both difference and sameness simultaneously. In other words, each shape in the sequence can be considered the same shape expressed in various degrees of modification. I will return to this point later, but for now we can ask: How does this example apply to the notion of metamorphosis in nature?

In *The Metamorphosis of Plants*, Goethe (1790) took great pains to describe clearly and objectively the various organs of the plant, noting morphological details of shape, size, juxtaposition, and so forth. One of his many key insights was the observation that the plant is all "leaf," meaning there is one transformative movement, one gesture (not an actual leaf) that comes to expression through the various spatially arranged organs, such as among the leaves up the stem, in the calyx, corolla, and stamens:

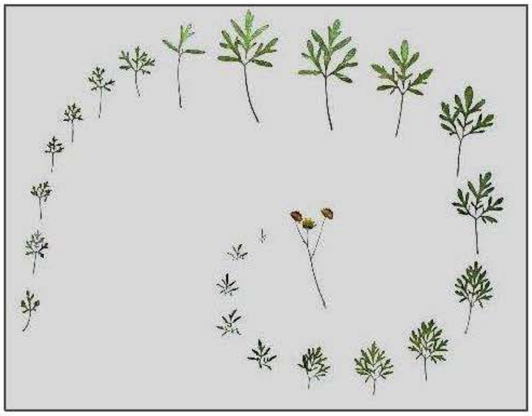
The organ that expanded on the stem as leaf, assuming a variety of forms, is the same organ that now contracts in the calyx, expands again in the petal, contracts in the reproductive apparatus, only to expand finally as fruit (ibid., p. 100).

In other words, there is *one* ideal organ that comes to expression in modified form along the length of the plant. This is the essence of metamorphosis: Both unity and its manifestation in diversity are entwined in the phenomenon. Evidence of this notion includes plant structures that are morphological combinations of two organs, as if the differentiation process were unable to actualize fully; or organs that appear in the "wrong" place. This can occur as a "mistake" in development, such as the proliferous rose that caught Goethe's attention in that it possessed a stem with leaves protruding from the center of the flower; or the proliferous carnation that exhibited multiple additional stalked flowers growing out of the main corolla (ibid., pp. 93–96).

Many plant species, however, demonstrate configurations of incomplete differentiation under *normal* circumstances, e.g., the familiar poinsettia (*Euphorbia pulcherrima*; Euphorbiaceae), in which the pollinator-attraction role, usually characteristic of the corolla, is shifted to the brilliant red upper leaves; or the neotropical heliconias (Heliconiaceae) where intermediate forms between leaf and bract are typical (***fig. 2***, below).

To grasp fully the notion of metamorphosis, one needs to hold difference and sameness simultaneously in one's consciousness (as in the example of figure 1). Bortoft (2012) described this cognitive experience as an act of distinguishing:

Distinguishing is a dual movement of thinking which goes in opposite directions at once: in one direction it differences [read as a verb], whereas in the other direction it relates. So the act of distinction 'differences/relates'—not differences and relates, because this would be two movements, whereas there is one movement which is dual (ibid., p. 22).



We can practice this mode of cognition by studying the leaf metamorphosis of a given plant. As in many annual plants, the ragleaf bahia (*Bahia dissecta*; Asteraceae) (***fig. 3***, above), a common plant of the central Arizona highlands, exhibits a marked transformation of the leaf shape up the stem, technically known as *heterophylly.* In preparing this figure, I removed the leaves from the stem and then dried, pressed, and arranged them in a spiral, the lowest stem leaves at the bottom left; the uppermost leaves and terminal flowers, near the center of the arrangement.

One can readily see the progression of one leaf shape to the next in the sequence. Clearly, no two leaves are identical. Note that it's through their ordered differences that the movement or gesture becomes intelligible. As in figure 1, there are several morphological trajectories that intersect. For instance, note how leaf size expands then contracts, or how leaf shape becomes less differentiated and then more complex, or how the relative length of the petiole (leaf stalk) at one point begins to shorten. Regarding the contraction of leaf size toward the apex of the stem, one observes that the final leaves seem to disappear from space; they become insubstantial so that a new metamorphic impulse can come into being, that of the flower.

Based on the preceding, one needs to regard the space *between* the leaves—what I will call "betweenness"—as a crucial aspect of the wholeness of the phenomenon. Just as in the structure of a musical melody the intervals are equally as important as the notes, experiencing betweenness among the parts of an organism—a plant, in this case—is the key to finding wholeness, or meaning, in the phenomenon. Brady (1998) referred to this quality of betweenness as the "context of movement," which relates and integrates all the spatially disparate parts into a unified whole.

Of course, nothing tangible is in motion in figure 3; it's only in the mind's eye that a movement or gesture comes to expression. But once the attentive observer grasps the context of movement—the dynamic quality of betweenness in the metamorphosis—it becomes objectively evident what may constitute the potential, as yet unmanifested, forms. Just as one can draw endless triangles or rectangles if one grasps the "rules" that inform them, so can one draw endless leaves that could conceivably fit into the sequence.

The next step is to regard how a particular flower is associated with a given leaf metamorphosis. Compared to imagining a potential leaf in the sequence, this effort is much more challenging because it entails a yet deeper cognitive experience of the plant, an experience that approaches what Goethe described as the *Urpflanze* or "Archetypal Plant." Goethe pointed to this experience and its associated application:

With this model and the key to it, it will be possible to go on forever inventing plants and know that their existence is logical; that is to say, if they do not actually exist, they could, for they are not the shadow phantoms of vain imagination, but possess an inner necessity and truth (from Goethe's Italian Journey, *in Brady 1987, p. 268).*

If we direct our attention toward seeing the botanical structures clearly in all their detail, and seeing betweenness not as an intellectual abstraction or as an empty void but as a dynamic reality, then we approach what can be considered the organizing principle and the dynamic wholeness of the plant. Bortoft (1996, pp. 240–241) describes this experience; note how the distinction between subject and object, observer and observed, simultaneously unites/dissolves:

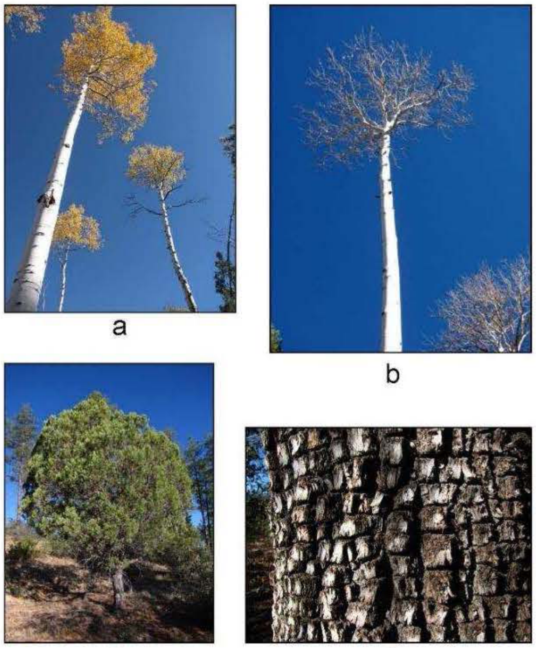
The organizing principle of the phenomenon itself, which is its intrinsic necessity, comes into expression in the activity of thinking when this consists in trying to think the phenomenon concretely. What is experienced is not a representation of the organizing principle, a copy of it 'in the mind,' but the organizing principle itself acting in thinking.

In the last part of this essay, I outline some possible examples of this phenomenological approach through which we can attempt to grasp betweenness as a dynamic reality such that all parts become revelations of the whole. Besides observing and comparing the structures of a plant, one can apply the same way of seeing to an animal. Holdrege (1999), for example, examines the biological details of the sloth, noting how all its parts, including behavior, integrate into an expressive whole. No part of the animal is superfluous and each has significance in the context of the living organism.

Another approach is to contrast two seemingly very different organisms so that each can be used to illuminate the other. Here, too, Holdrege (1998) provides an example in his comparison of the horse and the lion; whereas the horse accentuates, for instance, the skeletal system and hooves by providing a rigid support structure (the horse can sleep standing up), the lion is dominated by the muscular system, which exhibits remarkable suppleness and dramatic swings between tension and relaxation (when relaxed, the lion collapses to the ground).

One can apply this comparative method also on a landscape level. For example, in the central Arizona highlands, the aspen (*Populus tremuloides*; Salicaceae) is a familiar and striking tree. It has a thin, tall, straight appearance, its branches extending from the upper trunk (***fig. 4a***, next page). Its bark is white and even rubs off like talcum powder. The individual leaves flutter with the slightest breeze (hence the Latin species name) and, in the autumn, turn a stunning gold before dropping. One can regard the aspen as having an open "sensitivity" to its surroundings: the trembling leaves, the thin bark, the dramatic seasonal change of appearance, and the delicate, fuzzy catkins. More than many temperate tree species, the architecture of the aspen resembles a neuron complete with axon and dendrites (***fig. 4b***).

In striking contrast, the alligator juniper (*Juniperus deppeana*; Cupressaceae), found mostly at lower elevations than the aspen but overlapping in some areas, exhibits a rounded, enclosing crown, in which dense clumps of needles sway together



a b c d

when a strong breeze moves through the tree (***fig. 4c***). The bark, from which the tree gets its common name, is remarkably thick and deeply furrowed (***fig. 4d***). As a conifer, the juniper is evergreen and shows little change in appearance through the seasons, thus a relative lack of sensitivity to its surroundings. Like the tree itself, its fruits are spherical, fleshy berries relished by wildlife.

In comparing the aspen and alligator juniper, one notes that they are *morphological polarities*; once these endpoints are identified, a context is provided to examine other local trees with "intermediate" forms. For example, the ponderosa pine (*Pinus ponderosa*; Pinaceae), another conifer, with its less dense, more airy structure and flaky, even sweet-smelling, bark, exhibits a more open architecture than the "self-enclosed" alligator juniper, while the emory oak (*Quercus emoryi*; Fagaceae), with its partly stunted, twisted architecture, thick, grooved bark, and stiff, contracted leaves, also stands between the juniper and the aspen but leans somewhat closer to the former. Just as the leaf sequence of an annual plant creates a context for envisioning potential leaves, so a careful comparison of forest trees offers a descriptive means to situate particular species in a web of morphological relationships (Schad 1967).

The search for betweenness via the Goethean tradition can be extended further to examine an entire group of closely related (or not necessarily related) organisms. One ground-breaking work is biologist Wolfgang Schad's study of the entire class of mammals (Schad 1977, 2012; Riegner 1998). Echoing Goethe's archetypal plant, Schad's exhaustive observations uncover the interweaving of morphological trajectories that reiterate in various configurations in different species of mammals. Inspired by Schad's contribution, researchers have used his approach to investigate morphological patterns in dinosaurs (Lockley 2008), birds (Riegner 2008), and general patterns of evolution (Rosslenbroich 2014).

These journeys into whole-organism biology are just a beginning. In time, as more studies demonstrate the value of a phenomenological approach, a metamorphosis of the sciences themselves may lead to new explorations of the dynamics of wholeness in nature.

References

Amrine, F., Zucker F., & Wheeler, H., eds. 1987. *Goethe and the Sciences*. Boston, MA: D. Reidel.

Bortoft, H. 1996. *The Wholeness of Nature*. Hudson, NY: Lindesfarne Press.

Bortoft, H. 2012. *Taking Appearance Seriously*. Edinburgh, UK: Floris Books.

Brady, R. H. 1987. Form and Cause in Goethe's Morphology. In F. Amrine, F. Zucker, & H. Wheeler, eds., *Goethe and the Sciences,* pp. 257–300. Boston, MA: D. Reidel Publishing Co.

Brady, R. H. 1998. The Idea in Nature: Rereading Goethe's Organics. In D. Seamon & A. Zajonc, eds., *Goethe's Way of Science*, pp. 83–111. Albany, New York: SUNY Press.

Goethe, J. W. von. 1790. *The Metamorphosis of Plants* [photographs by G. L. Miller]. Cambridge, MA: MIT Press, 2009.

Holdrege, C. 1998. Seeing the Animal Whole: The Example of the Horse and Lion. In D. Seamon & A. Zajonc, eds., *Goethe's Way of Science,* pp. 213–232. Albany, NY: SUNY Press.

Holdrege, C. 1999. What Does it Mean to be a Sloth? *NetFuture* [on-line journal], no. 97 (Nov. 3); article available at: www.natureinstitute.org/nature/sloth.htm [last accessed July 2, 2014].

Holdrege, C. 2013. *Thinking Like a Plant*. Great Barrington, MA: Lindisfarne Books.

Lockley, M. G. 2008. The Morphodynamics of Dinosaurs, Other Archosaurs, and Their Trackways. In R. Bromley & R. Melchor, eds., *Ichnology at the Crossroads,* pp. 27–51. Society of Economic Paleontologists and Mineralogists Special Publication 88.

Miller, D. E., ed. 1988. *Goethe: Scientific Studies*. Princeton, NJ: Princeton University Press.

Riegner, M. F. 1998. Horns, Hooves, Spots, and Stripes: Form and Pattern in Mammals. In D. Seamon, & A. Zajonc, eds., *Goethe's Way of Science*, pp. 177–212. Albany, NY: SUNY Press.

Riegner, M. F. 2008. Parallel Evolution of Plumage Pattern and Coloration in Birds: Implications for Defining Avian Morphospace. *Condor* 110: 599-614.

Riegner, M. F. 2013. Ancestor of the New Archetypal Biology: Goethe's Dynamic Typology as a Model for Contemporary Evolutionary Developmental Biology. *Studies in History and Philosophy of Biological and Biomedical Sciences* 44: 735–744.

Rosslenbroich, B. 2014. *On the Origin of Autonomy*. NY: Springer.

Schad, W. 1967. *Zur Biologie der Gestalt der Mitteleuropäischen Buchenverwandten Bäume (Fagales). Elemente der Naturwissenschaft* 7: 11–24 [Toward a Biology of Form: Central European Trees of the Beech Order (Fagales)].

Schad, W. 1977. *Man and Mammals: Toward a Biology of Form*. Garden City, NY: Waldorf Press.

Schad, W. 2012. *Säugetiere und Mensch, 2 bände*. Stuttgart: Verlag Freies Geistesleben, [English translation in prep.].

Seamon, D., & Zajonc, A., eds. 1998. *Goethe's Way of Science*. Albany, NY: SUNY Press.

Figures: 1. Sequence of oval shapes; 2. Heliconia plant showing transition ("metamorphosis") between leaf and bract; 3. Leaves and flowers of ragleaf bahia; note the metamorphosis; 4a. Aspen tree in autumn colors; 4b. aspen architecture's resemblance to a neuron, with axon and dendrites; 4c. alligator juniper; 4d. detail of alligator juniper bark.