



In Context

A Publication of **The Nature Institute**

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#50

Fall 2023



The Nature Institute

Dear Readers,

With this 50th issue of *In Context*, we also celebrate The Nature Institute's 25th anniversary. I recently looked at the first issue of *In Context*, which came out in the spring of 1999. I was interested in how we described the nature of our germinal enterprise and what we hoped to accomplish. I was surprised and also pleased to see how the fundamental intent of the work has remained in focus all these years. We haven't wavered from what we then viewed as essential, and yet we have also done much that we would not have dreamed of at the time.

Over the years we have delved into many different topics, inquiry that has led to a great variety of articles in this publication—information technology, whole organism plant and animal studies, genetic engineering, light and color, Goethean methodology, genetics, and evolution. What has united these manifold explorations is the underlying striving to connect with the world in ways that our modern habits of thought have hindered. This intent is clearly expressed in our founding mission statement, which we still wholeheartedly embrace:

Nature around us is whole and interconnected. Though we are part of nature, we do not yet fathom nature's depths, and our actions do not embody her wisdom. A fundamental shift in our way of viewing the world is necessary if we would contribute to nature's unity rather than dissolution. At The Nature Institute we seek ways of knowing and doing that are fashioned after nature's own wholeness. Science becomes a participatory dialogue with nature, wherein each phenomenon finds its unique, contextual expression.

This striving is part of the stream of scientific inquiry that Goethe so strongly set in motion more than two hundred years ago. We thought that it would make sense in this issue to let Goethe speak for himself (p. 12). He was a master of language, and even in the English translation you can hopefully gain a sense of his flexibility of thought, which doesn't get stuck in coined phrases and always endeavors to find concrete wording for the insights he's trying to express.

One of the key elements of a Goethean approach is the commitment to careful attention to sensory phenomena, and just as careful attention to the way we form our ideas in an ongoing back and forth with the phenomena. A general tendency today is to only see what we already know. We don't perceive what a phenomenon actually reveals in the moment unless we make the effort to attend to its various characteristics and qualities. It is this kind of attentiveness that can open up the living qualities of our world.

In this issue, my feature article brings together many different ways of attending to plants that we have practiced in our courses and that also form the basis of my own plant research efforts. We hope that the description of such practices can stimulate you to embark on your own journey to the open secrets that are waiting to be discovered in the natural world.

Craig Holdrege

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Putting Goethean Ideas to Work

Reflections from a Course Participant

MATTHEW SLAUGHTER

Matthew Slaughter is the founder, president, and laboratory director of Earthfort, LLC, a company based in Corvallis, Oregon, that helps farmers worldwide rebuild and protect the vitality of their soils with natural, holistic practices and products. Matt works directly with growers as a consultant and educator. He came to The Nature Institute in 2022, as a participant in our 15-month Foundation Program in Goethean Science to deepen his holistic understanding and teaching. Here he reflects on how our program has impacted his work.

As a result of my Foundation Program studies at The Nature Institute, I have begun actively changing how I conduct my business. The greatest change is in how I facilitate my workshops. Instead of explaining concepts — as I used to do — now I take clients on a walk through a natural area and discuss what we are seeing and ask them questions. Afterwards we talk about what they have observed, paying attention to details. I listen carefully to what farmers are seeing and their explanations for things. I also integrate more sensory learning where we touch, smell, and look at soils directly.

Much of this has to do with the basic idea that there are many perspectives. So, for example, when a client comes to us about an issue with their soil, we do not immediately assume that something is "wrong." Rather we seek out various aspects of past practices, and what was used in the system that could have contributed to the situation. Working together, we then determine the best course of action. So rather than assign a "problem," we simply move towards a solution which is based on observable factors and the desired outcome. Sometimes the situation demands an action that on the surface seems "wrong," but the need is such that it turns out to be "right." For example, in vineyards there is a disease called "bunch rot" that is caused by a fungus that infects the newly forming grapes; if untreated, it will kill the grapes later in the season. Though our preferred approach is to only treat diseases in a curative fashion, in this case we must act preventatively.

The biggest area of growth for my business is in partnerships. I see this now as a "holistic" practice of working with others, forming opinions, activities, and directives collaboratively. It requires thinking outside of my own needs and those of the business to incorporate the needs of other related entities, the community, the environment, etc. I also



Masai women farmers from Kenya learning to make compost from local materials and liquify it into a soil amendment for their crops. The bag they are holding was specially created by Earthfort for the process. IMAGE CREDIT: PETER ASH

must keep in mind the wellbeing of all the stakeholders: clients, partners, vendors, employees, and families involved.

Earthfort operates with a triple-bottom line business model that integrates profit, people, and environment when making decisions. This also impacts how we approach the kinds of products we make and sell, as well as the services we offer. For me it is important to look at all the elements and potential impacts of a project; if they are not beneficial to the whole, then I choose not to do them. Operating this way has helped Earthfort grow a lot, even during the pandemic, where the focus shifted to relationship-based business practices instead of "just selling stuff."

Through my experiences at The Nature Institute, I have also begun to implement more hands-on methods, from workshops that focus on direct experience (instead of lectures) to field testing and observation. There's much less emphasis on lab work, more on field work. The big advantage to this is the opportunity to engage farmers in their fields, learn from them, and then combine this with local experiments and lab testing to create a greater understanding of the farmer, the farm, and how both relate to the local ecology.

My new work in Kenya is all about observing phenomena — a practice well developed at the institute. We created a demonstration farm in Kisumu County that compared "materialistic" (conventional chemical) farming to "living" (biological/natural) farming. The results were profound, as revealed



Earthfort's demonstration farm in Kisumu County in Kenya shows cabbage grown using conventional chemicals (plot on the left) and larger cabbages grown with natural amendments.

in the crop image on left. The more robust, bigger cabbage was grown with our natural approach, the smaller cabbage was cultivated the conventional way. While these crop results are impressive, I believe the main advantage of our method goes beyond yield; I see that farmers become more engaged with our process because their own actions have an impact, and they are not fully at the mercy of fertilizer applications and rain.

Of course, this is an ongoing story — the work we do, the constant learning and bringing into sharper focus the needs of the whole. As it continues, I am grateful for the valuable insights and teachings gained at The Nature Institute that help me daily.

A Project on “Intelligence in Nature”

CRAIG HOLDREGE

In the past few decades, scientists have begun to research and publish studies on intelligence in nature in ways that would not have been thinkable for much of the 20th Century. Although scientists have long spoken of intelligence in animals, now this term is used to characterize the way plants, fungi, and microorganisms live their lives. The ideas of intelligence and consciousness in nature are “in the air” and have found their way into many popular books.

Such developments in mainstream science are often indicative of new kinds of interests and sensibilities. The use of the term “intelligence” implies that some form of agency or inwardness exists and is at work in living organisms. This notion certainly goes beyond the mechanistic paradigm that still dominates biological thinking. If you think that one material happening causes another material happening, and that the totality of these cause-effect relations make up organic life, then you have a mechanistic view of life. This approach leaves no room for agency or inwardness. So to bring forth the notion of intelligence in all forms of life presents a real challenge to the prevailing paradigm. And it is, as you can imagine, highly controversial within the community of academic biologists.

It has long been a practice at The Nature Institute to carefully consider such potential paradigm-expanding developments within mainstream science. Recently we embarked on a journey to explore contemporary research into “intelligence in nature.” One especially “hot” topic at the present is plant intelligence. We are focusing our efforts on this area in the coming year. Our work involves the careful study of the primary scientific articles that claim to demonstrate plant

intelligence and articles that are critical of this view. We discuss such articles in our research meetings. We hope to come into conversation with researchers who promote the idea of plant intelligence.

While we are still at the beginning of this undertaking, an interesting and significant challenge has already become apparent. The philosophers and scientists who write about plant intelligence are often motivated by the desire to raise the status of plants within the consciousness of scientists and the public at large. They believe that for far too long plants have been considered passive creatures. Significant abilities of plants have been overlooked and neglected. One approach to raising their status is to describe their capacities as intelligent. This brings them closer to humans and animals. Here is a quote from a recent article by a group of scientists who research plant intelligence:

Plants have developed complex molecular networks that allow them to remember, choose, and make decisions depending on the stress stimulus, although they lack a nervous system. Being sessile, plants can exploit these networks to optimize their resources cost-effectively and maximize their fitness in response to multiple environmental stresses.... We present concepts and perspectives regarding the capabilities of plants to sense, perceive, remember, re-elaborate, respond, and to some extent transmit to their progeny information to adapt more efficiently to climate change. (Gallusci et al. 2023 *Trends in Plant Science*)

This excerpt gives you a sense of how plant intelligence is now being characterized. Plants are spoken about in terms we use to describe human capacities and agency. This is interesting. We know very well from our own experience what it is to remember, choose, make decision, re-elaborate, or respond. Evidently, the scientists believe there are phenomena within plants that justify such expressions.

Since I have studied plants for many years, questions immediately arise: What are, precisely, the phenomena that the researchers refer to when they say plants are making decisions, remembering, and so on. Are such expressions

appropriate to plants? When scientists use human-centered concepts to describe the capacities of plants, are they projecting human qualities into plants and thereby perhaps glossing over plant-specific forms of intelligence? At a fundamental level: How can we as researchers find ways to express the capacities of different kinds of beings that correspond to their nature? Might the idea of “intelligence in nature” need to transform and take on new features each time one considers a different kind of being?

These are the kinds of questions that inform our inquiry. You can expect to find relevant articles in future issues of *In Context*.

Addressing Climate Change in Education

JON MCALICE

It is an ongoing question how climate change, and all the phenomena related to it, can be better addressed in schools. Rudolf Steiner, the founder of Waldorf education, emphasized how essential it is for students to come to an understanding of what is happening in the world around them. With this aim in mind, a small group of Waldorf school teachers joined Nature Institute faculty in July to deliberate on three climate change questions: What are core phenomena we need to grasp in order to understand the complexities of climate and its change? Do the curricular indications given in the early years of Waldorf education provide a guide to helping students come to understand Earth as a living whole? What key experiments or series of experiments can support a growing understanding of the processes at play in global warming?

We focused specifically on grades 7-12, the years during which a desire to form individual judgments based on understanding awakens in students. This awakening is accompanied by an upwelling of youthful idealism. One of the challenges we face in teaching adolescents is to find the right balance between these two, often contradictory, gestures. How do we help students come to an understanding of the factors at play in climate change and how it affects life on Earth that doesn't leave them feeling hopeless and disempowered, that can help lead to a feeling of responsibility for her wellbeing? We were guided by the assumption that climate change is not something that can be “fixed,” but rather challenges us to learn to know Earth differently.

The way children and adolescents engage with Earth changes in the course of their development. Young children who are given the opportunity to experience the natural world directly through meaningful activities can grow to both trust nature and to keep a sense of wonder alive for the beauty and mystery that we find in nature. Being with adults who care for Earth is essential. A second phase in the development of the child's relationship with Earth begins when we look more closely at the phenomena of the natural world. In the Waldorf curriculum, this intensified focus on natural science spans the period from the 6th to the 10th grade and culminates in learning to know Earth as a living whole. Once students have gained insight into the natural processes and interrelationships that bring about climate change, they have a foundation from which to work towards a better understanding of the socio/cultural aspects of the problem, addressing topics of economics, climate justice, and exploring possibilities of constructive change.

By the end of our time together, it was apparent that we had only begun to develop a picture of an educational approach to climate change that could help students strengthen their resolve to bring about transformation. A second colloquium at the institute is planned for February 2024 during which we plan to continue the work with an emphasis on experimental sequences that help us understand the basic phenomena underlying the changes taking place on a global scale.

News from the Institute

Events

- Representing The Nature Institute, Craig and Henrike Holdrege, Marisha Plotnik, Ryan Shea, and Bruno Follador participated in a **colloquium in Nailsworth, UK**



on March 23 – 24, initiated by the institute in collaboration with Ruskin Mill Trust. The intergenerational group of 17 individuals engaged in dialogue on **the tasks and the potential of phenomenological research and practice in our time** as well as on collaborations among researchers. The colloquium took place at Ruskin Mill's beautiful Field Centre. On the evening of March 24, a large audience participated in the inauguration of the Ruskin Mill Centre for Research. As part of the event, Craig offered a talk on "Intelligence in Nature? — An Exploration."

- Last May, the faculty of The Nature Institute hosted **Dr. Lenny Moss from Universidad Nacional Autónoma De Mexico** and **Dr. Daniel Nicholson from George Mason University** for a two-day colloquium on questions of agency and how we understand it in relation to organisms. Time spent observing specific organisms grounded the work in shared experience, leading to a more concrete recognition of the differentiated expression of agency in various gestures of wholeness. Both guests expressed their appreciation for the opportunity to actually observe specific organisms, and for the open, exploratory nature of our dialogue.

- Our new colleague Ryan Shea co-led a summer weekend workshop with the eco-poet Scott Edward Anderson called "**Seeing—Reading—Writing: Transforming Our**



Relationship to Language and Nature." Focusing on the milkweed colony that was in full bloom at the institute, they helped participants explore how a creative use of language can intensify, deepen, and transform our experiential encounter with the natural world. As solo presenter, Ryan brought this same topic to students at **The Catholic University of America** in a one-day workshop on October 21.

- In June, the institute welcomed back 18 participants enrolled in our **Foundation Program in Goethean Science** for their final two-week onsite intensive and the completion of their course. You can glimpse some of their varied activities in **the photo essay on page 8** of this issue.



- This past summer, Jon McAlice travelled to San Francisco several times to work with the faculty, staff, and board of the **San Francisco Waldorf School** on questions of school governance and pedagogical creativity. In addition, he led a one-week intensive for the school's high school teachers focused on the development of resonant classroom spaces where students can participate more fully in the learning process.

- Artist Ella Lapointe began teaching the third in a series of "Drawing into Nature" courses at the institute. The fall 2023 course focuses on "**Color and Form in Nature**" with participants meeting every Tuesday afternoon from September 12 through November 14. By necessitating careful observation to serve the activity of drawing, the course aims to help us grow capacities for attention, slowing down, and centralizing our experience of the natural world.



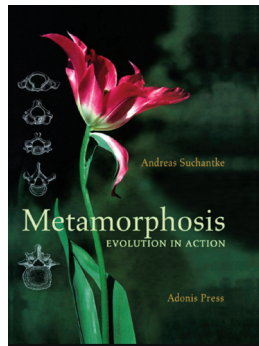
- Jon McAlice was in Switzerland in September to work with Waldorf school teachers on questions of embodied learning and to represent the **International Teacher Education Project** in the preparation of an international teacher education conference planned for April 2024.

- In September, Henrike and Craig participated in the **World Goetheanum Conference 2023** in Dornach, Switzerland. The four-day conference included three-session forums that addressed a variety of challenging societal issues. Craig was a co-contributor in a forum concerned with "**Follow the Science!?**" It considered how we see "the authority" of science, and in what ways science is in need of transformation through artistic and social practices.

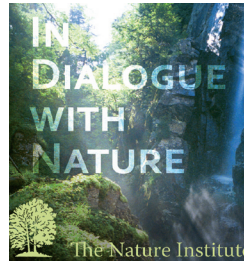
- On November 2, at 7:00 pm, Ryan Shea will give a talk at the institute, **“Living in the Present: Practices for Being In and With Nature.”** He will explore ways to overcome the distractions of modern life and become fully present by working through several concrete practices with plant and animal teachers. Ryan’s talk is free and open to the public.

- This fall, Jon McAlice and Henrike Holdrege are hosting a series of four interactive online presentations for the Anthroposophical Society of America. Each 75-minute session addresses the topic of **“Engaging in Goethean Practice: From Transformation to Metamorphosis.”**

- A group of 14 people who have completed our Foundation Program is currently meeting biweekly online for a period of six months to intensively study Andreas Suchantke’s magnum opus **Metamorphosis: Evolution in Action** (Adonis Press; 2011). Led by institute educator John Gouldthorpe, this collective reading and discussion of the content will also examine both perceptual and cognitive faculties that can help or hinder our ability to be in relationship with the natural world.



- Henrike and Craig will **teach in Brazil** later this year. They will give a 3-day workshop near São Paulo that introduces participants to Goethean practice. The event is hosted by Escola Schumacher Brasil. Afterwards, they travel to **Associação Sagres** in Florianopolis to teach the second (and final) two-week module of their course **“Seeing Nature Whole — A Goethean Approach.”**



Recent Podcast Episodes

You can find our podcast on the institute’s website (natureinstitute.org/podcast/in-dialogue-with-nature) or wherever you access podcasts.

- As of this writing, we are working on a three-episode podcast based on Craig Holdrege’s article, **“Where Does an Animal End? — The American Bison,”** which first appeared in issue #45 of *In Context*. Each of the three episodes will feature Craig first reading a section of the article, followed by his conversation about the text with our podcast host, John Gouldthorpe. Also coming up is an audio and video version of Craig and Henrike Holdrege’s interview in Brazil, describing their work and Goethean science.



- In the episode **“Two Kinds of Darkness,”** institute co-founder and educator Henrike Holdrege joins podcast host John Gouldthorpe to discuss two unique demonstrations she employs to develop a more nuanced understanding of the interplay of light, darkness, and matter.

- In a talk recorded at the institute, **“Experience, Imagination & the Nature of Meaning,”** Jon McAlice briefly traces the philosophical history of human relation to meaning in the natural world through the ideas of various 18th century thinkers. Jon then arrives at his central theme: In a world increasingly objectified by science and technology, are there ways of being that allow us to *experience* the presence of meaning in the natural world?

From Our Mailbox

I have just read Steve Talbott’s “Preface to a Thirteen-Year Project” in issue 49 of In Context. Mr. Talbott’s growth is evident in everything he writes. I admire his ongoing effort to reshape thinking about the foundations of biology. His opening remark about trying to imagine himself as a crow and seeing with “crow vision” has, I think, much broader import than it might seem. At some level, the attempt to see the world as other humans see it — including those biologists Mr. Talbott discusses — is just as alien and just as hard as imagining “crownness.” I commend him for making the effort. — Neil Ruggles

Your recent podcast, “Two Kinds of Darkness,” was a good experience. The descriptions of experiments and experiences played out well and clearly for a presentation where the subject is intangible. . . Compliments on the good audio recording. So often its importance is ignored. Your work has always given me hope that we can meet the Spiritual with clarity.

— Tom Patsenka

Foundation Course Summer Intensive

This past July, the fourth cohort of our Foundation Course, *Encountering Nature and the Nature of Things*, completed the 15-month program with a two-week intensive at the institute. There were 18 participants, some of whom came from as far as Australia, Malaysia, and Brazil. Here we share highlights from the first week of the intensive that was dedicated to exploring essential aspects of our world that we all too easily take for granted — the qualities of solid, fluid, air, and warmth. We carried out many observations and relations, which let

us explore how these qualities interact with each other in dynamic ways: the solid and the fluid, fluid in fluid, warmth interpenetrating with solid, fluid and air. Our explorations and discussions were enriched by our daily study of Georg Maier's essay "The Classical Four Elements as Different Ways of Approaching Nature" (which you can find on our website).

A new Foundation Program begins in March 2024; to learn more about the program visit <https://www.natureinstitute.org/foundation-course>.



Observing the many subtle aspects of a candle flame and the process of burning.



Reflecting on our observations.

You have illustrated the power of reuniting science and art as ways-of-knowing.

— Laura Wallwork

It was tremendously useful to have whole group reflections where we could hear what other people had observed or learned.

— Beatrice Ungard

The course is a transformative and cathartic engagement with the world of the senses, the inner world of my own soul experience, and, most essentially, their intrinsic weaving togetherness.

— Joshua Kelberman



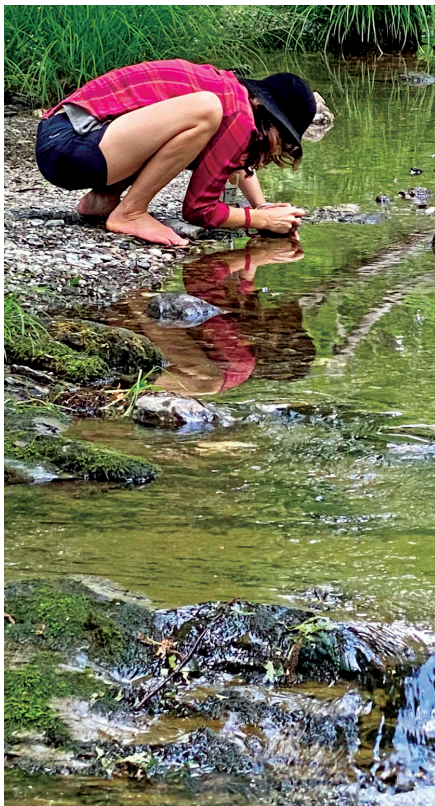
Cold colored water billows upward as it is warmed from below with a heat lamp.



Creating vortex trains in a shallow container by moving a stick straight through drops of ink in sugar water.



Diluted ink dropped into water and stirred to observe.



Exploring fluid dynamics at a creek.



Rock stacking — balance is beautiful, and surprising.

THE NATURE INSTITUTE'S 25TH ANNIVERSARY

Core Intentions, Reflections, and Looking Forward

On September 9th, the institute marked its 25th anniversary with a special and festive public event attended by about 60 local friends and supporters. As Henrike Holdrege remarked in her introductory words, the anniversary presents the opportunity to reflect on the core intentions of the institute and to reflect on the 25 years of work. Following Henrike's introduction and clarinet music by Paul Hasse, five individuals shared thoughts and impressions: director Craig Holdrege, board member Marisha Plotnik, who will join our staff in Fall 2024; our colleague Ryan Shea, who started working at the institute this year; *In Context* editor and outreach coordinator, Elaine Khosrova; and our colleague Jon McAlice. The lively and diverse contributions provided a many-sided picture of what individuals experience as the central contributions and intent of the institute.

It is impossible to give a picture here of all that was spoken. We'd like to share from just one part of Jon McAlice's contribution. He pointed to three qualities of Goethean scientific practice. In our work we delve into concrete phenomena of the world and in doing so, more riddles and questions open up. The world becomes ever deeper, ever richer. This endeavor is humbling and gives rise to what he called increasing humility in encounters with the world. At the same time, the world becomes ever more interesting. Jon spoke of the enthusiasm that arises in attentively exploring that which may at first glance seem simple and mundane. Finally, he characterized Goethean work as a kind of reciprocal hospitality — inviting the richness of the world into our lives through research and education endeavors, and along the way we can begin to experience the world as inviting us in. We move beyond the felt separateness that often colors and places hindrances in the way of our deeper experience and understanding of the world.

In her opening remarks, Henrike emphasized that this anniversary recognizes the past years of work but also marks the commencement of the next 25 years. The Nature Institute is in a phase of transition. The colleagues who have carried the work for so many years have begun working side-by-side with new colleagues. It is the sincere hope of the founders that in this way a new team of colleagues will form in the coming five to seven years and lead the institute into the future.

Since 1998, the core work of the institute has been carried by co-founders Henrike Holdrege and Craig Holdrege, and with Steve Talbott, who joined the institute right after its inception. Steve transitioned into emeritus status in 2023. Henrike and Craig remain active, and along with Jon McAlice, will shepherd the transition process as it develops in the coming years.

For an institute to be a living endeavor, it needs to be nourished by inspirations that find their way into concrete activities, and those activities can only exist with the support of many, many people and foundations. We want to take this opportunity to thank all of you who, in one way or another, have contributed to the flourishing of our efforts!

Thank You!

We are privileged to thank all who have made donations or contributed goods or services to *The Nature Institute* between April 30, 2023 and October 1, 2023.

PLEDGES

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Fall Matching Grant

Two of our generous supporters have offered to match all donations to *The Nature Institute* this fall up to \$10,000. With your help, we can raise as much as \$20,000 to support our education programs and provide scholarships for our intensive courses. Every dollar we receive by December 20 will be doubled, up to \$10,000! You can give to the institute by check or credit card using the enclosed envelope, or by credit card at our website (<http://natureinstitute.org/friend>). Thank you for your energizing support.

In this 50th issue of *In Context*, we'd like to extend a very special thank you to graphic designer Mary Giddens, who has skillfully designed every issue since the spring of 1999. For generously giving her time and expertise to support *The Nature Institute* for nearly 25 years, we are deeply honored and grateful.

Dialogical Knowing

Excerpts from Goethe's Writings

In this 50th issue of *In Context*, which also celebrates *The Nature Institute's* 25th year of activity, we want to acknowledge our indebtedness to Goethe, whose work has inspired our efforts since our founding. We do so by letting him speak for himself through the following excerpts from Goethe's work that highlight his approach. These are texts that we have also studied often with participants in our courses. CH

from On Morphology (1807)

The Undertaking Justified

When we human beings confront nature, we may at first experience a tremendous urge to bring the objects of observation under our control. Before long, however, these objects will thrust themselves upon us with such force that, in turn, we will feel the need to acknowledge their power and revere their effects. When we are convinced of this mutual interaction, we can perceive a two-fold limitlessness: among the objects, manifold ways of being and becoming in all their living interactions; in ourselves, the potential for infinite growth of our sensibilities and judgments by cultivating ever new forms of receptivity and counteraction.

These conditions provide much enjoyment and would bring the last touch of happiness in life if not for certain inner and outer obstacles on this beautiful pathway to perfection. The years, providers at first, now begin to take. To a degree we are satisfied with what we have gained and enjoy it all the more quietly, since it seldom meets with any genuine, open and vital expression of interest from without.

How few are those who feel themselves inspired by what is visible to the spirit alone! Our senses, our feelings, our disposition exercise far greater power over us, and rightly so, since we are dependent on life and not on reflection.

Unfortunately, even among individuals devoted to cognition and knowledge do we seldom find the desired degree of interest. For people of practical mind — who note details, observe precisely, and draw distinctions — what arises from an idea and leads back to it is viewed as an encumbrance. They feel in their own way at home in this labyrinth and have no interest in a thread that might more quickly lead through it. A metal that has not become a coin and remains uncounted is a burdensome possession. In contrast, someone with a higher vantage point easily disdains the particular and makes a lethal generality out of a concrete life.



The Intent Introduced

When we observe objects of nature, especially those that are alive, and desire to gain insight into the relation between their inner nature and their doings, we may believe that the best way to gain knowledge is to divide things into their constituent parts. Such an approach may, in fact, lead us far. A few words suffice to acknowledge the contributions of chemistry and anatomy toward an understanding and overview of nature.

But these attempts to analyze, carried to an extreme, also produce many adverse effects. To be sure, what is alive can

be dissected into its parts, but from these parts it is impossible to restore it and bring it back to life. This is true even of many inorganic substances, not to mention organic bodies.

Scientific minds of every epoch have, therefore, also exhibited an urge to understand living formations as such, to grasp their outer, visible, and tangible parts in context, to see these parts as an indication of what lies within and thereby to take hold of and behold the whole. It is no doubt unnecessary to describe in detail the close relationship between this scientific desire and our need for art and imitation.

The history of art, knowledge, and science has produced many attempts to establish and develop a discipline that we will call "morphology." The historical part of our discourse will deal with the different forms in which these attempts have appeared.

The Germans have a word for a real being's complex of existence: *Gestalt* [structured form]. With this expression they abstract from what is dynamic and assume that an interconnected whole, when identified, is self-contained and fixed in character. But if we look at all these *Gestalten*, especially the organic ones, we will discover that nothing in them is permanent, nothing is at rest or self-contained — everything is in a flux of continual motion. This is why German frequently and fittingly makes use of the word *Bildung* [formation] to describe what has been brought forth and what is in the process of becoming as well.

When introducing morphology, therefore, we should not speak of *Gestalt*. If we do use the term, we should at least refer only to an idea, concept, or experience held fast for a moment in time. What is formed will be re-formed again. If we want to behold nature in a living way, we must follow her example and become as mobile and malleable as nature herself.

from Toward a General Comparative Approach (1790–94)

The statement “The fish exists for the water” seems to me to say far less than “The fish exists in the water and by means of the water.” The latter statement expresses more clearly what the former obscures: namely, the existence of a creature we call “fish” is only possible under the conditions of an element we call “water” — it not only exists in that element, but also develops there.

The same holds true for all other creatures. The initial and very general observation on what works from within outward and what works from without inward would be as follows: The culminating *Gestalt* is, as it were, the inner core that has been molded in various ways by the characteristics of the outer element. Thereby the animal retains purposefulness in relation to the outer world since it is shaped from without as well as from within. And this is all the more natural because the outer element can shape the external form more easily than the internal core. We can see this most clearly in the various species of seals in which the exterior has taken on a fishlike form even though the skeleton still retains all the features of a quadruped....

We raise our deliberation to a higher level when we consider the structured world itself as an interrelationship of many elements. The entire plant world, for example, will appear to us as a vast sea that is as necessary to the existence of individual insects as the oceans and rivers are to the existence of individual fish. And we will see that an enormous number of living creatures are born and nourished in this ocean of plants. Ultimately we will see the whole world of animals as a great element in which one species is created, or at least sustained, by and through another. We will no longer think of connections and relationships in terms of providence or purpose. Rather, we progress in understanding only by discovering how formative nature expresses itself from all sides and in all directions. We will find through experience and through the advance of science that the most concrete and far-reaching benefits for humanity come from an intense and selfless effort that neither demands its reward at the end of a weeks’ labor, nor needs to produce some useful result for humanity after a year, a decade, or even a century.

from Significant Help Given by an Ingenious Turn of Phrase (1823)

In his *Anthropology*, Dr. Heinroth ... speaks favorably of my work; in fact, he calls my approach unique and says that my thinking works *objectively*. Here he means that my thinking does not separate itself from objects; that the elements of the objects, the perceptions of the objects, flow into my thinking and are fully permeated by it; that my perception itself is a thinking, and my thinking a perception....

I must admit that I have long been suspicious of the great and significant-sounding task: “know thyself.” It has always seemed to me a deception of a secret order of priests who wished to confuse human beings with unreachable demands, and to divert attention from activity in the outer world to some inner and false contemplation. As human beings, we know ourselves only insofar as we know the world; we perceive the world only in ourselves, and ourselves only in the world. Every new object, clearly beheld, opens up a new organ in us.

Those fellow humans can be most helpful who have the advantage to compare us with the world as they see it from their point of view. They thereby attain a closer knowledge of us than we ourselves are in a position to gain....

Stimulated by these very considerations, I continued in my self-examination, and found that my whole method relies on derivation. I persist until I have discovered a pregnant point from which much may be derived, or rather — since I am careful in my work and observations — one that yields much freely of its own accord. If I discover in experience some phenomenon that I cannot derive, I let it stand as a problem. This approach has proven quite advantageous during my long life. When after a long time I could still not decipher the origin and connections of some phenomena, and I had to put the problem aside, years later at one moment the relationships became clear in the most wonderful way.

Epirrhema (published 1827)

When considering nature
Attend always to the one and to the many;
Nothing is inside, nothing is outside:
Since what is inside is also outside.
So behold without delay
The holy open secret!
Enjoy the true appearance [semblance]
And the serious game;
Nothing alive is a one,
Always it’s a many.

Translations by Craig Holdrege. To translate the prose texts, in addition to working carefully with the German essays, Douglas Miller’s translations in Goethe: The Scientific Studies (Princeton U. Press, 1995) were consulted for wording and phrasing.

Plant Observation

Enhancing Our Capacities to Perceive and Understand

CRAIG HOLDREGE

In adult education programs at The Nature Institute, which we have been offering since 2002, a central emphasis is learning through direct experience. In many courses and workshops, a focus has been the study of plants and through it the development of phenomenological practices. In 2022, I was asked by the *Biodynamic Federation – Demeter International* to contribute to a manual that would include observational practices. What follows is a lightly edited version of what I submitted. I have brought together and described many exercises. Some of the descriptions are drawn from publications in which I placed these kinds of exercises in larger contexts (see “Further Resources and References” at the conclusion of the article). In the order that I present them here, the exercises build on and augment each other in a meaningful way. That said, the sequence is not meant as “first you must do this before you do that.” All the exercises can be varied and expanded.

1. Plant Observation in a Group — Into the Phenomena

Going outside, I ask everyone to look at a particular species of plant. I have selected the plant beforehand: It is a wildflower that is flowering and can be easily found in fields or along roadside edges. We walk around and see where it is growing. I ask everyone to take a few minutes, look at the plant and its surroundings, and then pick one specimen. If there are many specimens, we may dig out the plant with some of its roots. We then sit in a circle (inside or outside), each person with his or her plant. I give some guidelines for our observational process: We will go around the circle and each person will describe an observation of the plant. I request that descriptions be kept fairly brief so that everyone gets a chance to share observations with the others. I ask that we try not to repeat what others have said, a suggestion that encourages mutual listening. I also request that those participants who may know botanical terms use them only if everyone else can follow the description. We are not focusing on our personal responses to the plant but want to bring out characteristics of the plant that we can



perceive. Finally, I say that we are not concerned here with explanations, causes, or models. We are not asking “why” questions; we simply want to take in and describe what the plant has to offer.

We describe, moving from the bottom to the top of the plant. I will not try to reconstruct the whole process, but just give a few examples: A person is looking at the lower part of the stem and describes the clear transition between the whitish root and the upright stem, which at its base is purplish and then turns green. Someone else describes the stoutness of the stem and the fine hairs that are mainly present along its vertical ridges. Another person describes the oval shape of the lower leaves with their smooth margin, and notes the veins, especially visible on the leaf’s underside. You can imagine that with such detailed observations and descriptions, we are carefully attending to what can be seen, felt, and smelled on the plant. We might go around the circle two or three times until we have a sense that we’ve attended to the different features of the plant. Such a process may take an hour if not more.

Although deceptively simple, this process yields many fruits. First, and perhaps foremost, it is a cathartic practice to step out of everyday habits and to simply give one’s full attention and time to something one would normally, at best, take in only with a glance. It helps us realize that we almost never look at things in a careful and detailed way. How often we gloss over things! Moreover, we are impressed by the plant in all its detail, pattern, and variability. In one course at The Nature Institute, we studied common



milkweed and a participant remarked: “I always look at milkweed differently now. I had the profound experience that, even as a total

novice in the life sciences, I could, through attentiveness to the natural world around me, come to know it better.” This can happen with the most inconspicuous wildflower. By looking carefully we take the plant seriously — we turn our unencumbered attention toward it. We see the plant as a being in its own right and learn to value it for its own sake. One person expressed it this way: “I will never walk past a daisy the same way!”

If we were to look at the plant from too narrow a perspective, this realization might well not occur. If we were interested only in, say, what medicinal properties a plant has, we could get a quick answer from an expert or book. But we are not carrying out a question-and-answer session with the plant. Instead, we are taking the time to perceive, to dwell with the plant and its features.

In this exercise we also notice that there is no natural end to observing. There is — even if we don’t dissect, use hand lenses, microscopes, or do biochemical analyses — always something more to see, smell, or touch. In this sense, the perceptual world has an endless richness of detail and pattern to disclose. It’s only we who choose to stop perceiving at some point. For most people this discovery is a kind of “aha” experience. We get a glimpse of what philosopher Merleau-Ponty once called the “hidden and inexhaustible richness” of the sense world (1969, p.139).

Something else is remarkable in the process of group observation. We notice how differently people perceive and describe. Everyone in the circle realizes that, alone, he or she would not have seen nearly as much. Our senses are opened and directed in new ways by what others perceive and describe. Some people have an ability to see more of a detail that others don’t attend to, like one participant who never left the root, even after everyone else was focusing on the flowers and fruits. Or the person who noticed the different shades of green, or how the plant felt when she waved it back and forth as if in the wind. The plant reveals more and more of itself as different people make different discoveries. Knowledge arises in a community. Through such a process a learning community develops, and, in Goethe’s words, “The interest

of many focused on a single point can produce excellent results” (1995, p. 12). The unique perspective each person takes truly enriches the whole.

What allows different perspectives to show their best sides is the fact that everyone’s attention is on a phenomenon about which people don’t have a great deal of pre-knowledge (prejudices and assumptions). They can look in quite an open way. Even people who have studied botany have rarely looked at one plant for so long and in such detail. Also, it’s not about what we know from memory or our book learning, but about what we perceive *right now*.

Different people can have different perceptions, but these differences do not create separation; they enhance one another. We learn to appreciate the different ways people observe and describe.

There may at times be need for clarification and more precise or accurate formulation, but that can all be achieved through recurring attentiveness to the thing itself and through mutual effort to find ways to adequately express what we’ve perceived. The plant is a natural corrective for flights of fantasy or mere opinions. All we need to say is, “Look again.”



2. Simple Drawing Exercises

Drawing can help facilitate looking. As John Ruskin noted in his classic *The Elements of Drawing*, “We always suppose that we *see* what we only know” (1971, p. 28). We all “know” that a blade of grass is green. We may even believe we see it as green when, in fact — if we put aside our preconception and actually look — the blade of grass is yellow in the particular light conditions in which we are observing it. Anyone who looks closely observes that color is dependent on the illumination. We have to look; we can’t *know* the color beforehand. Similarly, we may know that the form of a building is rectangular, but when we attend to what we see, from the particular standpoint we have, we notice that if we draw a rectangle for the face of the building, we are drawing something that looks

completely wrong. So drawing can lead us out of our mental preconceptions and into the appearing phenomena themselves.

Ruskin spoke of regaining a childlike “innocence of the eye” (p. 27) that can open our perceptions and give us the



possibility to draw what we see: “For I am nearly convinced that, when once we see keenly enough, there is very little difficulty in drawing what we see.... I believe that the sight is a more important thing than the drawing; and I would rather teach drawing that my pupils may learn to love Nature, than teach the looking at Nature that they may learn to draw” (p. 13). Drawing in this sense is a schooling of seeing — a way of opening up our looking and orienting it around the fine nuances of form, shadow, and color. One course participant remarked: “Of most value was the increasing ability to see and to see how little I see. I feel that my eyes have been newly enlivened, and I want to keep drawing.”

In some courses we started by drawing a white-colored ball on a cloth; the ball was illuminated from one side so that it threw a shadow onto the cloth. This setup provides a wide spectrum of light and dark shades and the “simple” elegance of the sphere. We draw in such a way that we do not make outlines — a line as a boundary is the creation of the intellect; what one actually sees are shades of light and dark. In trying to put these shades on paper, we notice how the object emerges out of the interplay of light and dark and how its bodily, three-dimensional aspect becomes all the more “visible” on paper the more we can do justice to the seen patches of brightness and darkness and the transitions between them.

On the basis of such an exercise, we turn to an organic form, such as the leaf from a tree. We sketch it first by filling

out the form from the inside out. Again, no outlines but shading from the center and moving toward the edges. It’s not so important that every detail is “right,” but that the form emerges centrifugally. Then we do the exact opposite: we start by shading the outside — the space around the leaf — and move in toward the leaf margin. In this way we draw the space around the leaf, and the leaf emerges as the “empty” space in the middle. This trains our observation to attend to a form in relation to its surrounding. Drawing the leaf from the inside out is much easier and comes more naturally — natural for our object relation to the world. It is more difficult to take the space around the leaf to be “real,” draw it, and let the leaf emerge in this way.

The process of drawing presents challenges, because we often struggle with our own limits in technical facility, but if that concern can be overcome, we make discoveries. In the words of a course participant:



“The drawing started out very difficult for me. I wanted to do it and be done. I was surprised as I sat with my drawing and ‘what’ I was drawing, that I really could take the phenomenon in and express it on the paper by going into it. It helped to bring up and demonstrate the going in and going out. Working in one color only also was amazing in helping me feel subtle gradations rather than discrete ‘things.’”

Through drawing we are, literally, drawn into the phenomena.

3. Sauntering of the Senses

Another kind of exercise complements the focused attention to detail in observation and drawing. We let our attention spread out and wait to find what comes toward us. Here we don’t predetermine what we attend to but, in a sense, invite the world to speak. Henry David Thoreau describes the intention:

I must walk more with free senses — It is as bad to study stars & clouds as flowers & stones — I must let my senses wander as my thoughts — my eyes see without looking.... Be not preoccupied with looking. Go not to the object, let it come to you.... What I need is not to look at all — but a true sauntering of the eye. (Journal entry; September 13, 1852)

Going for an unstructured walk is not easy. We strive



to enter a mode of open expansive attentiveness. We are not focusing, but we are expectant: What might come toward me? Or asked differently: How can I be wakefully “out there” so that things catch my attention? If something catches my attention — the way a leaf is oscillating in the wind; the bird that lands on a nearby limb; the sparkling dew drops on the vegetables; the way two cows are interacting — then I can dwell for a time and take in the scene. At some point I continue to saunter.

It is much easier to describe a plant in detail than it is to go sauntering with open senses. In the latter case we must willfully try to open our attentiveness and invite the world in — we have little control, and that is both unsettling and cathartic.

One exercise that helps bridge the gap between controlled focus and the ability to saunter with the senses is to choose a broad sensory focus for attention. For example: We go for a walk and decide to focus our attention on color. Or we focus on scent, or on sound. This focus by no means determines what we see, smell, or hear, but by narrowing our attentiveness to a sensory modality we are more receptive to that realm of experience.

One day I was walking in a forest and wetland preserve with the intent of paying attention to light in the forest. I began noticing what I otherwise took for granted and had not really seen at all: the dark areas, the spots that were very bright, the more diffuse columns of “sunbeams.” It was windy that day, so there was an ongoing play of changing illumination. At one moment a spot lit up brightly, changed form, and disappeared. I was strongly struck by this appearance. I don’t know why, and I cannot describe it any further. But it was a deep experience and one that I can remember back to, although that memory is by no means the same thing as the one-time, striking experience itself.

So far, I have described two complementary types of sensory observation exercises. In the one case — the example

of the plant observation — we go out with our attention to meet something particular and take it in with all its details. We move with our senses and attention in and through the phenomena. In the other case, we try to create a kind of open receptivity that allows us to take in what appears at a given moment.

Every perception of a thing or situation has these two aspects — focus and receptivity. Without these there would be no perception. By carrying out such exercises in both directions, we are honing our capacities to perceive the world around us. In this way we can shift

into a sensory mode, being with the things themselves. The two kinds of exercises enhance one another.

4. Exact Sensorial Imagination

When we have made the effort to perceive carefully, this interaction leaves an impression on us. New features of the world have become part of us. We can remember, at least to some degree, what we have seen, smelled, touched, or heard. So after we have carried out a variety of observation exercises, I request that participants in courses willfully re-picture or re-create in their imagination what they have perceived. Picture the color of the stem and how it changes from bottom to top; feel the consistency of the stem by imagining the feeling of the pressure you applied to it with your fingers; reawaken the fragrance of the blossom and dwell in it for a moment. In this way we can build up a vivid picture of the plant we have observed or of the meadow we have walked through. By doing so we awaken in ourselves what we have met through sensory engagement. We can actually remember much more than we realize, and, moreover, sometimes the hue of green or the shape of a leaf will speak more strongly in our inner picturing than it had in the moment of observing.

During a course, I ask participants to make re-picturing a daily practice: picture in the evening or morning the plant or environment with which we have been concerning ourselves. We talk about the experience of picturing, and people share their questions and approaches. It is fascinating how differently people picture. Often people notice that they couldn’t picture something because they hadn’t really looked at it.

What is the significance of inner re-picturing, which Goethe called “exact sensorial imagination”? First, it is a practice that allows us to connect ourselves consciously and vividly with what we have experienced. We bring to awareness what would otherwise sink into a sea of potential

memories. We willfully call up these experiences and enter into them with our picturing activity. This activity is imbued with feeling: not reactive feeling but feeling as a connecting agent, as an inner sensorium for qualities.

In perception we go out to things and invite them in; in exact sensorial imagination we re-create and enliven within ourselves what we have met in experience. In this way we connect deeply with the world we meet in sensory experience. One course participant described how the work in a course created “lasting experiences of the plants through the practical observation and visualization exercises — I feel I have ‘met’ two plants, as many of my perceptions still live fresh in my imagination.” We have taken the plant in and now we move it in us. Or, said differently, we come into inner movement by re-creating in imagination the qualities we have perceived. We can thereby become more aware of these qualities.

Second, this practice can help us to notice that we need to perceive more carefully if we are going to be in a position to faithfully re-create in ourselves a vivid image. This realization motivates a return to the phenomena.

Third, it is an aid to overcoming the tendency to think abstractly. In exact sensorial imagination we are using our mental capacities to get closer to the concrete sensory qualities. This contrasts starkly with an abstract frame of mind that uses concepts to explain and interpret what we perceive. Exact sensorial imagination lets our minds practice intimate dwelling instead of abstract distancing.

We can view perception exercises (1 to 3) and the practice of exact sensorial imagination as two polar practices that enhance each other. Both need to be practiced. By going out into perception and openly taking account of what the world offers we inform experience with the richness of the sensory world. Through exact sensorial imagination we connect these experiences with ourselves and at the same time become inwardly active. The world comes to life in us. We can practice a kind of pendulum swing between going out and bringing in and enlivening, going out again, bringing in and enlivening. My personal experience is that by doing this, both perception and picturing are enhanced. Through careful perception I participate in the phenomena. This gives me a wealth to re-picture. Through vivid re-picturing my attentiveness to the world is enhanced. I perceive vividly and more can be disclosed in any moment.

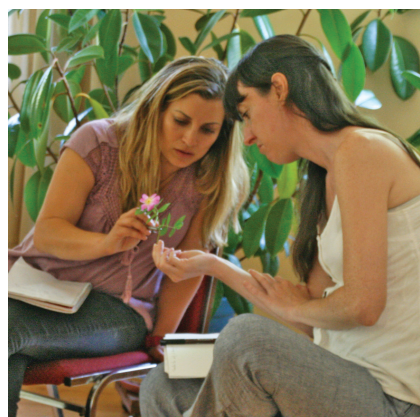
When we move far out into the world with our sensorial attention, we can then move far into ourselves; this allows us, in turn, to expand more into the world. “Outer” and “inner” can no longer be viewed as two distinct realms; they are two aspects of one oscillating activity. Inasmuch as we bring forth this dynamic movement, we are interfaces in which we and the world continually intersect in vibrant activity.

5. The Plant as a Being of Time and Transformation

In the first exercise, the task was to observe the plant as carefully as possible, staying with all the details. This allows us to practice exact sensorial imagination and to come into an intimate relation to concrete appearances as just described.

There is a danger in the first plant observation exercise — if that is all one does. The danger is that we have the parts but lose sight of the plant as a whole. We may lose the forest for the trees. Already doing the active re-picturing helps to avoid this. But there is more.

After doing the careful observation, in a next session it is good to ask: In what way — even when we only observe it at one point in time — does the plant show us that it lives in time,



that it goes through transformations? If you are looking at a flowering herbaceous plant (a wildflower, a flowering squash or pea plant) there are many features that lead us into time and transformation. It is good to have participants share what they can discover in small groups and then collect the observations. For example:

- Some leaves are wilted, others fully unfolded, and still others just emerging.
- The shape and size of the leaves along the main stem change in shape from bottom to top of the plant.
- In the axils of the leaves there are buds — hints of something to come.
- Some flowers are just opening, others are fully open and in some the petals are wilting.
- A few fruits (pods, etc.) are appearing.

In these and other characteristics the plant shows us that it is, at any given moment, in a state of becoming. We can see its passing (wilting), its present in manifold forms, and intimations of the future in buds and fruits (the bearers of seeds). We can see the expressions of its life activity. If we are open to it, the plant is always transporting us beyond the spatial into the temporal, into transformation, into life.



The transformative nature of a plant becomes all the more vivid of course when we observe the plant over time. It is a worthwhile experience to observe one plant during its growth and development. We never see the whole plant. We see snapshots on different days. We are seeing the tracks of its life process. The plant's life is a continuum, an ongoing unified process that mani-

fest in manifold forms and substances. We can consciously picture in our imagination, say, how the plant appeared one day and then again three days later. We let the one form morph into the other. In this way we come closer to the stream of the plant's life, to the plant as activity. It is through our exact imagination — through which we bring forth a transformation — that we get a sense of what the plant is doing day in and day out. This transformative life process is never apparent to our sensory observation. We need to become inwardly active to participate in the life processes of the plant. In Goethe's words: "If we want to behold nature in a living way, we must follow her example and become as mobile and malleable as nature herself."

6. Plasticity in a Plant Species

When we have observed a specimen of a species carefully, a next step is to observe it in different contexts. If we have attended to a common wildflower or "weed" (in the words of Emerson: a weed is "a plant whose virtues have not yet been discovered") we can go around and see how it grows along a roadside, in a ditch, at the edge of a hedgerow, in a garden, or at the edge of a compost pile. If we have observed a cultivated plant, even if the specimens are in the same garden or field, do they all look the same? How are they different when planted at different times or in a greenhouse compared to outdoors? The key is

to notice that we are seeing the same plant species, but we are beholding it in different manifestations.

The same plant species can range widely in size, in the shape of its leaves, in the extent of branching, and so forth. The image below shows different pressed specimens of wild radish (*Raphanus raphanistrum*) that were picked at the same time. They were all growing in the same area, but the microenvironments were strikingly different. As in the other exercises, we need to slow down and dwell with plants. If we only register, "Oh, they are different from each other," then we haven't really met the plant in its capacities. Here the activity of re-picturing is helpful: Picture the smallest specimen with its short main stem that hardly branches and carries few slim leaves. It was growing in "soil" that had been strongly compacted by heavy machinery the previous year. The largest plant — only 30 meters away — was growing at the edge of a meadow. Picture its effusive growth with many large leaves and strong branching that ends in a multitude of flowers. The other specimens were growing in the area in between these two plants.

Through such observations we begin to get the sense of the plant as a dynamic being. *It can be itself differently in different contexts.* The small plant is expressing in its form and substance something of the quality of the compacted dry earth it is growing in, just as the meadow plant is showing us what the richer soil means to it. We begin to see qualities of the environment *through* the plant.

Similarly, we can compare specimens of a vegetable variety growing in different parts of a field, or that have been sown at different times. Trees offer another potent opportunity to witness plasticity: How does a tree of a given species grow in an open field, at the edge of a forest, or in the middle of a forest?



7. What the Leaves of a Tree Can Teach Us: Variety and Potency

This is a wonderful exercise to do in a group. We go outside and consider one particular tree that has at least some of its leaves and branches at a height that we can observe closely. We spend some time looking at the tree as a whole: its overall form, its colors, the play of light, how its leaves and branches move (or don't) in the breeze. Then we move closer and observe one limb of the tree. How does it branch? How are the leaves and buds arranged on the twigs? As a next step — and in acknowledgement of and gratitude for the tree's abundance — each person picks just one leaf.

Then we go inside (or gather in a circle outside). Each person studies her or his leaf — exploring its characteristics with different senses. Then we close our eyes and try to re-picture that leaf. We look again, and re-picture again. As a next step, each of us passes our leaf to our neighbor on the right (or left). We consider this leaf for only a short time (maybe a minute) and then we pass it on. We do this until the leaf we started with returns to us. What an experience! The variation in the leaf size, shape, consistency, color! And we have only considered maybe 10 to 20 of the thousands of leaves on the tree. (It's also interesting how everyone becomes attached to "their" leaf.)

The photograph below shows leaves from one white oak tree (*Quercus alba*) that were pressed in the autumn, just before they would have fallen from the tree.



No two leaves are the same — we can observe as many as we like. This experience can fill us with wonder. Just imagine: Each year a deciduous tree in a temperate climate unfolds thousands of leaves, each unique and each part of the unity of the tree. And each year the leaves are new and different yet again. The tree as one organism brings forth itself (through its environment) in an unfathomable variety. We usually overlook this creativity of plant formation because

we stop with registering "this is an oak, a maple, or a birch." We don't make the effort to look more carefully. Here the key is that we don't look at just one leaf, but at many. Similarly, we can look at many branches of a tree, or look at many specimens of one species.

After we make these kinds of observations, we need to stop and consider the implications of what we have noticed. We realize that the tree has immense potency. Or we could say: The tree as a living being is creative potency and this potency is always greater than what comes to appearance in any given case. The tree as activity brings forth itself and all its members (trunk, leaves, and branches) in remarkable plasticity. Through this way of attending to a tree, we catch a glimpse of the creative power that is everywhere present in the living world.

8. Observing Seeds and Germination

How one prepares and carries out the following observations depends on the length and schedule of a course or workshop. In a short workshop, for example, the teacher will need to have planted seeds ahead of time so that the phases of germination can be observed in different specimens. In longer courses, participants can set up the experiments and observe the processes over time.

As in the previous exercises, we want the participants in each of the "steps" that follow to observe, note characteristics, describe changes, share impressions, inwardly re-picture, and actively participate in the process-nature of the plant by letting their imaginations morph the sequential snapshots into each other.

The dry seed: We begin by observing some seeds — shape, consistency, and so forth. Large beans are easy to observe. It is worthwhile to open up a dry bean along its "seams" and then with a hand lens or low-power binocular microscope observe any structures that may be visible. The bulk of a bean consists of the two nutrient-rich cotyledons. At one end it is possible to see the tiny primary root (radicle) and toward the other end, the growing point (apical meristem) and one or two tiny leaves that will develop into the first foliage leaves of the plant.

Swelling: We take a dinner plate and put a few layers of moist paper towels on it. We place a number of seeds on the paper towels and cover with another plate. In a warm room, already the next day we can observe how the seeds have changed. How are they different? We can open up a couple of seeds and look inside (as we did with the dry beans). Has anything changed? We can use the remaining seeds for the next exercise or plant them in earth in a pot for further observation.



Germination (1): We can use different seeds for this. Bean seeds and grains (wheat, corn) work well. We can either observe just one type of seed or compare different ones. Here is one setup and procedure that allows us to observe initial shoot and root development:

1. Wet two or three paper towels then line the inside walls of a tall drinking glass or a cylindrical glass jar with the towels. (The containers should be at least 15 centimeters high so that the roots have enough space to elongate; the photo below shows such a germination jar in the lower right-hand corner.)
2. Fill the core of the glass or jar with a crumpled sheet of newspaper. The newspaper will hold the wet towels in place. Wet the newspaper and let 1 to 2 centimeters of water pool at the bottom of the glass.
3. Now “plant” the seeds between the glass wall of the jar and the wet paper towels, fairly high up in the jar. You can place up to about four seeds in each jar.
4. Place the glass jar in a fairly warm place.
5. Sketch the setup.
6. Observe every day, note the changes in a notebook, and make sketches of how the seeds change, writing down the date for each entry and sketch. Keep the towels/paper moist.

In addition to the germination jar, the photograph shows a custom-made root box for observing germination and root growth in seedlings.

When ample time is available, we can have the same setup and then vary the conditions and observe what happens. For example, we place one jar in a sunny spot and another in shady conditions. Think about what the conditions are in the environment that allow the seed to germinate.

Germination (2): We take seeds and plant them in soil in pots or outside in beds. As above, we observe regularly and describe changes. There are many ways to vary and compare different conditions to observe the plant-environment relation: different soils, light conditions, watering, and so forth.

9. Does a Plant Grow out of a Seed? — A Contemplation

After carefully observing plant phenomena and working to bring the forms, processes, and relations to life in us, we can engage in a further kind of activity that builds on these experiences. We want to thoughtfully consider our experiences to gain deeper insights. Such contemplation based on careful observation is a capacity to enhance. This is not merely intellectually thinking *about* the seed as onlookers. We want the work we have done in the above exercises to lead into a mode of concretely thinking *with* the phenomena. We want to school pictorial thinking that is rooted in the vividness of sensory experience. In this way we can encounter riddles and gain insights that are not accessible to abstract thought.

Here I bring one example: What deeper meanings and relations can the seed and germination reveal? In what follows I will also incorporate knowledge gained from other experiences and from the scientific literature that can help shed light on the phenomena.

A simple question can stimulate a contemplative inquiry: Does a plant grow out of the seed? The answer seems obvious. But is it?

There is perhaps no process in the life of the plant that can evoke more wonder than seed germination. The seed is the most compact, condensed, and driest form that a plant creates. It contains, in germinal form, a whole plant surrounded by tissue from the mother plant. When released from the mother plant it becomes an independent entity. It can remain dormant — depending on the species — for a long time. This in itself is a riddle: the seed hardly seems alive — no growth and minimal metabolic activity that only





refined laboratory investigations can discern. Yet it harbors the potential for abundant life.

Only when the seed encounters particular conditions will it germinate. Some seeds need to go through the cold of winter or the heat of a wildfire to be ready to germinate. Most of the seeds we plant in a flower or vegetable garden need the warm moist soil to germinate. Then we can witness in a few days the beginnings of plant development. The germinal primary root (radicle), the cotyledons, and the growing point of the shoot (apical meristem) have formed while the seed was developing. What consequently emerges as root and shoot (or hypocotyl) through the seed coat as it breaks open, was not previously there. These are new formations; the plant is growing. There is the aspect of unfolding (especially apparent in the cotyledons), but it is not like unfolding a piece of paper, because growth is occurring at the same time. The shoot elongates, the leaves turn green (formation of chlorophyll). The plant is continually creating new substances and structures.

So where does the new substance of the plant come from? Without what was in the seed there would be no growth and new development. New life builds on already existing life. For a time, new substance may be formed through transformation of the substances (fats, proteins, starch) that the seed has stored. These were formed in the previous growing season. Soon, however, the seedling needs the interaction with the present environment to continue to grow and develop. (Already the swelling of the seed and initial substance transformations that lead into germination require warmth and water from the environment.)

The work of countless researchers during the past couple of centuries has shown that the plant needs air, water, the

soil with its minerals, warmth, and light to create its own living substance. This occurs through the miraculous process known as photosynthesis. The plant does not feed on other life as do animals; rather it creates living substance mainly out of these elements that it takes in from the environment.

If we say: “The plant develops out of the seed,” we focus on the necessary presence and activity of living germinal tissue in the seed. But we can shift our focus and say: “The environment (all I mentioned above) develops through the seed into the plant.” This is a strange formulation, I know. But what it does is to call our attention to the fact that a plant is not isolated. Its development is only in and through the world with which it has intimate connection. The plant is connected with a large world — one that extends at least to the sun — and this large world is transformed through the plant and becomes embodied in the processes of growth and development.

“The plant develops out of the seed” is a centered perspective — thinking from a center (seed) outward. It honors the potency of life inherent in every seed. (Remember the countless ways in which each particular species can bring itself to expression.) “The environment develops through the seed into the plant” is a peripheral perspective — thinking from a broad context towards a center. Here we see the environment in its plant-forming potential. Only in the active interplay of this center and periphery does life manifest in growth and transformation. Each plant species is a revelation of a particular way of being and at the same time a revelation of the world in and through which it develops.

A plant vitally seen and understood is world-plant.



10. Gesture — The Inner Coherence of a Plant

We all “know” that each part of an oak tree, a dandelion, or a spinach plant belongs to that plant and in one way or another contributes to its existence. In this sense we take the wholeness and inner coherence of the plant for granted. The question arises: Can we learn to see how the parts cohere, how they are expressive of a unified character or quality? All the exercises described so far facilitate the

forming of capacities for such holistic insight. What is the “oakness” in the oak, the “calendulanness” in the calendula? The goal is not to be able to nail down that character, but to see if through moving through the parts of the plant and the way it relates to its environment something of that character shows itself as an inner quality, as a kind of gesture. It may be very hard to communicate that character, but in group work we can share impressions and attempt to express the character or gesture in words, movement, drawing, or by other means. In my experience, we often do come to a similar sense of that “something special” that shines through the characteristics of the particular species.

One fruitful way to get closer to the expressive character of a plant is to compare it with another plant. First go into the characteristics of one plant in the ways already described: looking carefully; sharing with others; inner re-picturing; moving through the plant so that its process-character becomes more evident; seeing how different specimens relate to their environments and are expressive of it. When we have done this with one plant, we carry the impressions of that plant within us.

As a next step we turn to another plant. The experience with the first plant will illuminate the study of the second plant, just as its characteristics shed light on those of the first plant. It is good to choose a not too distantly related plant. For example, we compare one broad-leafed tree with another, or two wildflowers or vegetables that are in the same family. If we study an oak, the study of the maple will be enlivened by the oak.

It is not a matter of just registering: The oak has leaves, branches, bark, and fruit like this and the maple ones like that. When we observe the forms as expressions of formative moments, which we can do by carefully and consciously moving through the forms with our imagination as we observe, characteristic gestures may appear in the different features of the plant. Can we begin to see how the different aspects of oak speak “oak” and the different aspects of maple speak “maple”? In my article, “Phenomenon Illuminates Phenomenon” (see references), I have tried to express what course participants and I have discovered in carrying out this practice when studying two prevalent species in the forests of eastern North America, the white oak (*Quercus alba*) and the sugar maple (*Acer saccharum*).

An alternate entryway into this kind of study is to begin, say, with the leaf or fruit of an oak and then consider the leaf or fruit of a birch tree. What does the tiny, almost weightless fruit (nutlet) of the birch tell us about “birch”? What does the acorn tell us about “oak”? How different they are from each other! From these contrasting ways of

fruiting, we can then move onto the other features of the tree and see what shows itself.

This mode of gestural inquiry can be expanded into the study of different plant families. We

study, say, a number of different grasses and build up a picture of their salient features. When we then shift to studying the legumes in the same meadow, we discover a wholly different way of being — a different way of being plant.



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