

THE DELICATE BALANCE OF GAIA
Conference/Workshop Report
6-10th August, 2015
Oakdene Centre, Bear River, Nova Scotia
Duncan and Maggie Keppie, Jennifer Greene and Jonathan Swan



This unique conference brought water and rocks together as subjects of Goethean observation of the processes common to water and the earth as a step towards a deepening understanding of the “Living Water and Earth or Gaia”. The stage was set by presentation of a beautiful puppet production of Goethe’s *The Fairy Tale of the Green Snake and the Beautiful Lily* by a group of South Shore Waldorf parents under the direction of Monika Wildemann. Goethe regarded the Fairy Tale as his way of presenting his most profound observations of nature in the transformation of the soul. The Fairy Tale is set in a landscape divided by a river that depicts the boundary between two lands: the land of our normal ‘daytime’ consciousness and the land of the super-sensible, which is not accessible to our normal sense perception. By the end of the Fairy Tale, there is a permanent bridge spanning this river, joining these two Lands together. In this context, we “read the water and rocks” using experiments, and excursions around Bear River. Workshop themes centred around the ring vortex and archetypes.

Successive days followed a rhythmic pattern of welcoming the day with water- and earth-related songs led by Maggie Keppie, followed by a morning field trip, an afternoon experiment, a shared dinner on the banks of Bear River, an evening lecture, ending with a dance depicting the water/earth movements with Maggie and a Scottish slow air on the piano accordion played by Duncan Keppie. These activities were supplemented by molding clay from a sphere to a ring, an exercise that Rudolf Steiner used in embryology, and drawing vortex patterns on paper. Our last day together involved a walk to view the patterns in the river and in the rocks along its' banks followed by a meal in the park and concluding offerings.

Following the workshop, some of us visited Blue Beach to see the Carboniferous sedimentary rocks deposited by estuarine currents, rain drop imprints, and fossil plants and animals. On the return trip Jennifer and Jonathan stopped at Joggins UNESCO site to see the fossil trees.

Experiments

The first water experiment, “The Drop and Drop-Fall”, showed how out of the unity of a single drop of water, the drop metamorphosed, as it hit the water surface. Surface waves radiated out from the centre to be reflected off the glass walls back to the centre – the analogy was drawn with tsunami waves and led to an awareness of the rapidity of the movement and their speed. Beneath the surface, a spectra of vortices around the descending coloured ring vortex were observed. These phenomena event gave us a way of discovering the “art of placing a series of questions to Nature”, such that a step by step detail of water’s intrinsic nature could be seen.



<https://www.pinterest.com/> Institute of. Flow Sciences

<http://www.goodfon.su/>

and workshop

The second water experiment involved small scale fluid dynamics in the formation of a “rising ring vortex”. Once again, we could see what happens when water meets a surface within or at the water-air intersurface. So “surfaces” as boundaries, as opposed to layers, create a place of generative activity.

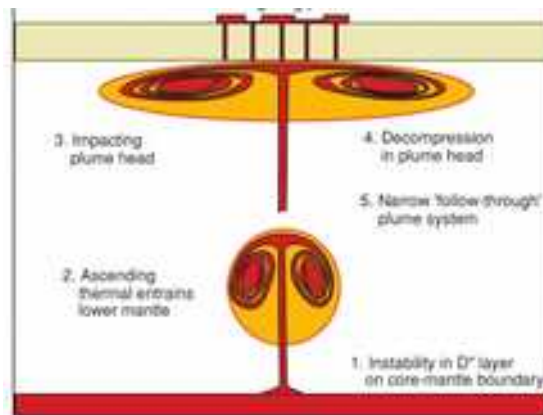


Successive top views (Institute of Flow Sciences)

Side view (Rob Dewdney)

These ring vortices are comparable to mantle plumes within the earth and to rising granite intrusions.

(after J. Tarney lecture)



The third water experiment created a “train of vortices” by drawing a small rod through a viscous solution on which lycopodium powder is sprinkled. The vortices alternate on either side of the trace of the rod, and may be comparable to mushroom-shaped fold interference patterns in rocks.



(Water Research Institute)

The fourth water experiment we worked with a “water trickle” that showed the vorticies produced in the inner bends of the river.



(from Jennifer Greene)

The trickle experiment gave insights into the deposition of sedimentary rocks from river systems.

Field Trips

The first field trip visited the Annapolis Tidal Power Plant where the enormous power of the water flow through restricted channels, which ran the turbines. The surface flow patterns of the rising water included ring vortices, and despite the enormous pressures that they generated, were cohesive in form. The comparison were subsequently made between man-made flow and flow forms generated out of water itself.

Mushroom vortices
below the Annapolis
Tidal Power dam



The second field trip took us to the Triassic and Jurassic rocks, 225 – 190 million years old, formed in a desert similar to the present-day Afar region. These rocks were formed in a rift valley (Bay of Fundy) during breakup of the supercontinent, Pangea. The rift was invaded by plateau basalt lavas erupted above a mantle plume, produced by a ring vortex, located off Florida. The presence of quartz, feldspar and mica was observed in the Triassic sedimentary rocks, whereas pyroxene and felspar were seen in the basalts.



Black plateau basalts
overlying
Desert reds beds

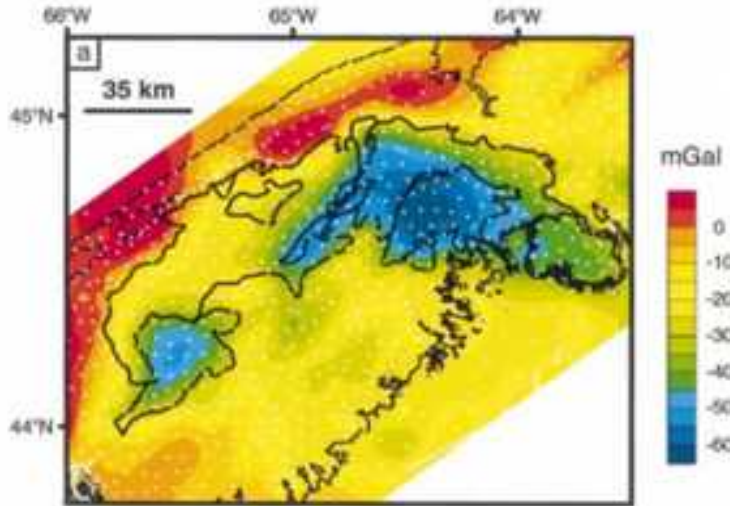
Cooling columns and oxidation
rings in basalt



The third field trip was along the southern margin of the Annapolis Basin where ca. 500 million year old, folded greywackes and slates intruded by basalt sill were to be seen. Again quartz, feldspar and mica were encountered in the greywackes, whereas amphibole and feldspar occur in the basalt. The field trip ended at an outcrop of granite and porphyry containing quartz, feldspar and mica.



Gravity map of SW Nova Scotia: blue = low gravity & represents stems of two mushroom shapes, a remnant of ring vortices.



Discussion ensued about whether “granite” is an archetype, and how it relates to the sedimentary rocks observed on previous field trips. Goethe definition of an archetype includes both: (1) something, variants of which are common to all rocks, AND appeared first - “food for further thoughts”.

For the final field trip we walked onto the Bear River bridge to observe the currents, vortices, wave patterns and interweaving wave movements as the tide changed from high to low tide. A short further walk took us to conglomerate deposited on a 440 million year old shoreline.

Lectures

(1) **Goethean Scientific Methods by Jonathan Swan**

(from <http://blog.goetheanscience.net/>)



Jonathan began with some anecdotes that shed light on the reverence with which Goethe approached Science and Nature. One of the moments described from Goethe's life, was when he was seven years old making an offering to God using a magnifying glass to catch the first rays of the morning to ignite incense on an altar of natural objects. A key event in Goethe's life occurred in his 19th year when he fell deathly ill and had to return home to Frankfurt Germany. At that time, Goethe came very close to a Rosicrucian Stream and underwent a lofty and remarkable initiation from an unnamed personality. This initiation flashed forth in his soul in the poem "The Mysteries" and in his "Fairy tale of the Green Snake and the Lily" (Reported by Dankmar Bosse's and Rudolf Steiner's research into Goethe's initiation). On an excursion in the Harz Mountains to examine a granite contact, his friend Von Trebra urged Goethe to be careful not to break his neck as he rushed over large, slippery boulders to "arrive at the great honor" of beholding the outcrop. Through repeated observation Goethe arrived at his ideas on the Metamorphosis of Granite.

To set the stage for the Gaia workshop, the remainder of the lecture focused on a discussion of Goethe's Scientific Method, which is illustrated in the following quotes by Goethe:

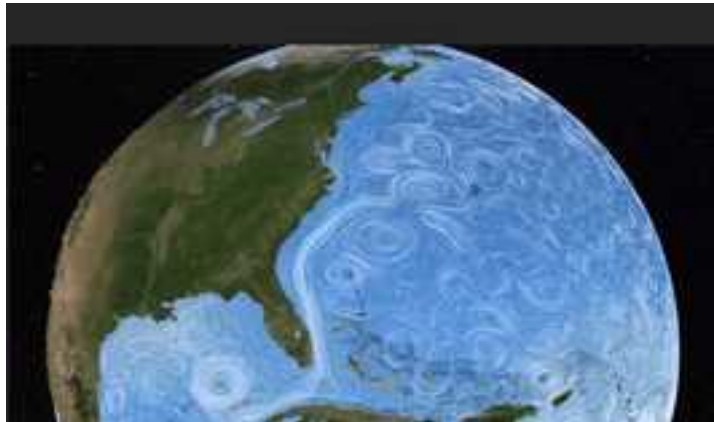
"I had to continue on in my old way, which required me to observe natural phenomena in a certain sequence of development through which I become aware of transitions as I accompany them backwards and forwards. Then through this I arrive totally alone to a living overview out of which a concept forms and in an ascending line I thus encounter the Idea." (Goethe Leopoldina Ausgabe, "Die Schriften zur Naturwissenschaft").

"If I look at the created object, enquire into its creation, and follow this process back as far as I can, I will find a series of steps. Since these are not actually seen together before me, I must visualize them in my memory so that they form a certain ideal whole. At first I will tend to think in terms of steps, but nature leaves no gaps, and thus, in the end, I will have to see this progression of uninterrupted activity as a whole. I can do so by dissolving the particular without destroying the impression [...]. If we imagine the outcome of these attempts, we will see that empirical observation finally ceases, inner beholding of what develops begins, and, at last, the idea can be brought to expression" (Goethe. "Studies for a Physiology of Plants").

The lecture ended with a reading of Goethe's poem "The Song of the Spirits over the Waters" (1779).

(2) The Intrinsic Nature of Water
by Jennifer Greene

(from NASA visualization lab)

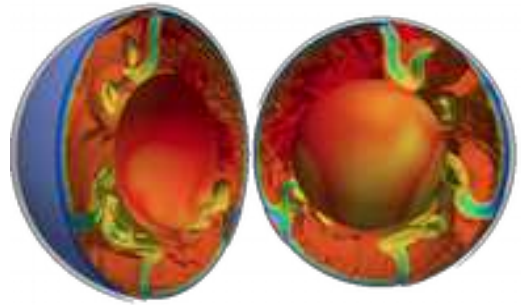


The Gaia workshop explored the intrinsic qualities of water, as best as our inner capacities could bring forth. Jennifer indicated that in order to study water, to come to know it on its own terms, one needs to become more fully human, to awaken inner capacities that are not unlike the very nature of water itself: to become inwardly mobile, open, flexible, selfless and true to purpose, to task. To work in this way is to develop exact observation skills of something that is not static, but rather, is evermoving, everchanging. Our starting point was that water has “a story to tell” about its nature, which is exhibited through the phenomena it shows and how it behaves. In the Goethean sense of “reading the Book of Nature”, our task was to discover, through careful and exact observation and a systematic series of enquiries, the qualities in water’s intrinsic nature that deem it as an “element for life”. The principles of water's intrinsic nature include form, rhythm and movement as gestures. Jennifer illustrated her talk with a number of movie clips showing the drop, the drop fall, the train of vortices, and metamorphosis in the rising ring vortex. When water moves it generates organic movement forms that are integrated, flexible and organized. Water teaches us to be flexible, to be open, to be inclusive and share, to serve all who come into our midst, selflessly, to keep moving, and to remain in the cycle. Understanding the intrinsic nature of water allows us to change the social paradigm from considering it as a commodity to a service orientation to secure a future for “good” water.

“We look a long time before we can see...the question is not what we look at, but how you look and what you see” (Henry David Thoreau).

(3) **The Body, Soul and Spirit of the Earth & Archetypes in Geology** by Duncan Keppie

(from Geophysical Fluid Dynamics, ETH,
Zurich, Switzerland)



Duncan started by asking the audience if the Earth was alive: most affirmed that it is alive. This raises another question as to how it is alive: as defined by Lovelock (1979) "...a complex entity involving the Earth's biosphere, atmosphere, oceans, and soil; the totality constituting a feedback or cybernetic system which seeks an optimal physical and chemical environment for life on this planet;" or the whole earth? This question was answered by examining up-to-date scientific knowledge in the light of spiritual science, and showing that the whole earth is a living being consisting of a body, soul and spirit corresponding to lithosphere, asthenosphere and core. A route into spiritual science was illustrated by thinking in 2D, 3D and 4D, where the fourth dimension involves time.

Duncan then moved on to the topic of archetypes in geology starting with Goethe's definition of an archetype or archetypal phenomenon as both: (1) a hidden relationship between parts that explains how one form can transform (metamorphose) into another form whilst being part of an underlying archetypal form, AND (2) first or primal appearance, i.e. sequences of forms moving through time are the field marks of an archetype. The field trips demonstrated that silicates such as quartz, feldspar, mica, pyroxene and amphibole and variants thereof are common to most rocks and appear in a complete range of ages of rocks. Vortices and ring vortices as processes in geology were illustrated, suggesting that they are archetypal processes.

(4) **Effects of Fracking on Earth, Water and Man** by Duncan Keppie

(from <http://fineartamerica.com/featured/1-the-cause-of-global-warming-marx-rehburg.html>)



Duncan illustrated this topic using the Windsor-Kennetcook Basin in Nova Scotia as a reference example showing that: (i) the size of the resource was grossly over-estimated due to the complex and many faults and fractures in the rocks that may have allowed the hydrocarbons to escape over the past 350 million years – over estimating the resource is a tactic used to solicit financing for exploration and drilling; (ii) the presence of faults and fractures provides channelways for contamination of ground and surface water, especially when fracking sets off small earthquakes resulting in opening up the faults and fractures; (iii) an exponential increase in small earthquakes has been documented in places subjected to fracking and re-injection of fracking fluids, e.g. Oklahoma; (iv) 60% of hydrocarbon wells are shown to leak after 15-29 years; (v) shale gas exploration is coincident with the best soils in Nova Scotia; (vi) hydrocarbon reserves will be exhausted by the end of the century; (vii) by 2100 temperatures are forecast to increase above those record over the last 7 million years, and carbon dioxide levels will show a tenfold increase since 1900 causing extinctions and food supply disruptions.

The Council of Canadian Academies has produced a comprehensive report on the effects of fracking: The Report on the Environmental Effects of Shale Gas Extraction in Canada, a peer-reviewed paper located at:

www.scienceadvice.ca/uploads/.../shale%20gas/shalegas_fullreporten.pdf

The Quebec provincial government has banned fracking based on an extensive report on the shale gas resource in Quebec: <http://www.bape.gouv.qc.ca/sections/rapports/publications/bape307.pdf>

What sort of world do we want to leave our grand children? Other source of clean, renewable energy need to be investigated, such as deep geothermal energy and artificial photosynthesis.

There were twelve participants at the Gaia workshop together with 4 leaders and seven puppeteers. The evening lectures were attended by several local people. We are grateful to Shirley and Klaus Langpohl for providing accommodation in their cottage for the leaders and several other participants, and their help in facilitating local logistics. We thank Marcella Edwards for taking photographs of the workshop. Several Bear River residents also helped in publicity and logistics -we are grateful for such local support. The Gaia workshop was sponsored by the Anthroposophical Society in Canada, the Nova Scotia Group of the Anthroposophical Society in Canada and the Natural Science Section of North America. For their foresight we offer our deep gratitude. It is hoped that his conference will be the first of others as we seek to understand the delicate balance of Gaia.



This Gaia workshop provided many lines of enquiry for further research: (i) is a ring vortex an archetypal process in water, rocks and many other places? and (ii) What is an archetype in geology? These topics will be pursued in ongoing research.