

Science and Mathematics Group of the Anthroposophical Society in Great Britain Newsletter – March 2018

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News

Obituary for Dr. Margaret Colquhoun

Overview of her work

Margaret Colquhoun's recent death on 3rd August 2017 marked the end of a significant period for Goethean Science in the UK. Margaret was a valued contributor to adult education trainings for nearly thirty years. She taught on masters' programmes at Schumacher College and the Scottish Institute of Herbal Medicine, as well as anthroposophical and biodynamic programmes in many locations. She was a keynote speaker at conferences of the Scientific and Medical Network and initiated events with the Botanic Gardens in Edinburgh, most recently with Johannes Kühl, leader of the Natural Science Section at the Goetheanum, Dornach. She was regularly engaged by many institutions and communities, including Emerson College, Findhorn, Park Attwood Clinic and several centres within the Camphill Movement, either to hold courses or as a consultant on landscape design. Many will recall her memorable contributions to "wandering" seminars such as the "Hibernian Way" and the "New Hibernian Way" some ten to fifteen years ago. These seminars were dedicated to experiencing the British landscape in its wider spiritual and geographical context. Margaret's relationship with the Hebridean Islands, Celtic boundaries and Western coasts of the British Isles was particularly intimate. She also felt a connection with Daniel Nicol Dunlop (1868-1935), a Scottish visionary and entrepreneurial anthroposophist, who founded the World Power Conference in 1923. Margaret led a seminar to research his biographical roots on the Island of Arran.

Since 1996, Margaret pioneered a land-based project as a centre for Goethean Science, landscape studies and ecology. Bordering on the Northern face of the Lammermuir Hills, East Lothian the project, known as Pishwanton Wood, has since been owned and managed by the Life Science Trust, a charitable vehicle founded to hold this property. Its buildings were originally designed by Margaret and architect Professor Christopher Day, as documented in his book "Consensus Design". The purchase of Pishwanton Wood was made possible through fundraising and two substantial gifts in 1996 and the project evolved into Margaret's most publicly visible achievement, on which she focused her energies increasingly though by no means exclusively, in her later years.

Some of Christopher Day's original designs were brought to fruition in Pishwanton Wood, after being converted into detailed drawings by architect Richard Shorter. These are evidenced in the craft workshop, the Goethean Science building and the most recently completed chalet, funded through both charitable and personal donations. All buildings were constructed using traditional building methods, almost completely without motorised or mechanical aid. The buildings would be inconceivable in their present form without Malcolm Lemmon's expertise in this form of construction, as well as his loyalty to the project over two decades. The wood soon expanded its scope to incorporate a smallholding for cows, sheep, goats and a horse. For Margaret, the presence of animals in Pishwanton went far beyond their utilitarian value – they were an essential part of the landscape, helping to manifest its living soul. Margaret was also an expert in caring for sick animals. She gained much respect for her devoted, "hands on" approach, successfully utilising natural and homoeopathic remedies to treat a range of common veterinary conditions, e.g., mastitis.

Margaret always acknowledged her early teachers, both in Britain and abroad. It was to Michael Wilson who researched Goethe's colour theory and Olive Whicher, projective geometer, to whom she dedicated the Goethean Science Building at Pishwanton. She maintained a strong personal friendship with Lawrence Edwards, mathematician, author and former Upper School teacher at the Edinburgh Steiner School. His meticulous research revealed the mysteries of plant and animal morphology, and she held him in high regard. Courses in Pishwanton Wood always spanned a wide range of themes, and included workshops on landscape and architectural design, medicinal plant studies, animal and human comparative morphology, nutrition and indigenous crafts. In all these fields, her core impulse was to nurture, encompass and integrate artistic and scientific faculties. This was reflected in the diversity of her many collaborations, including, to mention only a few, Michael Bate (medicinal plants), Wendy Cook (nutrition), Axel Ewald (sculpture), Christopher Kidman (eurythmy), Richard Ramsbotham (literature and drama), Judyth Sassoon (plant chemistry and alchemy), Margaret Shillan (painting) and, most recently, Lothar Haasis (architecture). At least six courses were typically scheduled each year, although their frequency and enrolment declined in recent years (as in many other adult education programmes throughout the country). The last modular course completed by Margaret was "Beholding the Heart of Nature". Margaret's approach was notable for its use of Goethe's method of observation combined with her understanding of the Seven Life Processes, as outlined by Rudolf Steiner. For Margaret these became instruments for enlivening sense perception, cognition and for acquiring a deeper appreciation of the laws underlying metamorphosis.

In the decade following the late 1990s, ecologically based activities thrived in Pishwanton Wood. There were annual school work camps, outdoor cooking and craft activities. There were sometimes up to four volunteers contributing to the intensive on-site life and work, particularly over the summer months. Herb gardens were designed and created amidst boulders and clay; paths were constructed using gravel from a

local quarry; wooden bridges were built over boggy terrain; birch fences were woven; apple orchards and thousands of indigenous trees were planted; natural water systems were installed and in autumn, fruit were harvested and processed. Numerous grants from both local and national charities supported these activities, including the National Lottery and private donations. Margaret herself was a successful fundraiser during this earlier period although later, as grants became harder to achieve and fundraising became an industry, the number of successful applications unfortunately diminished.

Margaret's inherent kindness and wish to collaborate and build a community were not always matched by an ability to delegate. In practical life and tasks she was not the best of communicators and confusions and misunderstandings sometimes arose. She had a stubborn and defensive streak in her personality, most evident when tired and pressurised for a decision. Yet she would usually run the extra mile for a friend or a sick animal and would expect others to do the same. As her responsibilities increased over the years, her timekeeping suffered. Friends usually understand the reasons and made allowances but casual visitors found this frustrating and disappointing. In recent years it became increasingly difficult for Margaret to empathise with the expectations of younger volunteers, e.g. their need to have internet access, and some volunteers withdrew their help from the project. In very recent years Margaret's teaching lost its cutting edge at times, as her capacity to maintain her concentration diminished due to her encroaching illness.

Despite these limitations, it is no exaggeration to say that over the decades, hundreds of individuals were deeply influenced by Margaret's teaching and mentoring, which was unique, empowering and inspiring. For many individuals, her love for life and her relationship to the kingdoms of nature, which she was able to communicate, were life changing. Her only book, "New Eyes for Plants", written in 1990 with Axel Ewald, is still available in its second edition (Hawthorn Press). For Margaret, landscape became a living manifestation of the activity of spiritual beings, which she experienced in every blade of grass, every spade of compost. Perhaps it was this experience of the sacramental character of land-work that brought Margaret into a lasting connection with the Camphill Community impulse. It was important for her that the Pishwanton Project was accepted as a member of the Camphill Association, Scottish Region, in 2008. Sadly the considerable potential of this collaboration was not able to mature.

Margaret will also be remembered as a valued guest contributor at anthroposophical conferences, notably Stover in South Devon (1994), (marking the 70th anniversary of Steiner's Torquay lecture cycle "True and False Paths in Spiritual Investigation"), as well as other memorable events sponsored by the Section of the School of Spiritual Science UK. These included an especially inspiring conference in Penmaenmawr, to which German philosopher Frank Teichmann also contributed. In her last thirty years, Margaret cultivated an active relationship with the Natural Science Section of the School of Spiritual Science at the Goetheanum, Dornach, Switzerland. This was initially through its then leader, Dr. Jochen Bockemühl, from whom she received part of her training in Goethean Science, and more recently through current leader, Johannes Kühl. Margaret visited Dornach at least every two years and also mentored a number of students undertaking formal trainings in Goethean Science in Dornach. Her link to Switzerland and the Goetheanum was an expression of her profound connection to

the impulse of the Christmas Foundation Meeting of the Anthroposophical Society, 1923/4, especially in its structural and cultural expression through the Sections. However, she sometimes experienced difficulties integrating herself into the activities of the related Science Section and Science Group in the UK.



View from Pishwanton Wood.

Biographical aspects

Margaret Colquhoun was born Margaret Kelsey on 10th May 1947 in Ripon, North Yorkshire, where she received her school education, and showed considerable academic ability. She attended Edinburgh University in 1965, studying agricultural science, zoology and population genetics. The department was then under the leadership of Professor Conrad Waddington, who was also one of the late Professor Brian Goodwin's teachers and pioneered radical approaches in genetics. The term "epigenetics" was first coined by Waddington (see "Lectures" section, this Newsletter). After graduating in 1969, Margaret continued as a research associate in the Department of Zoology for two years, subsequently becoming a post-graduate student, and gaining a doctorate in evolutionary biology in 1978.

Through her active interest in climbing, Margaret met many world-class mountaineers during her university days - including (later Sir) Chris Bonington, Mike Galbraith, Doug Scott and David Bathgate, trekking with them up to Everest base camp and often engaging in some challenging climbing. She joined the British expedition to Mount Everest in 1972, to collect specimens for the Royal Botanical Gardens on Edinburgh. David Bathgate and Margaret were married in 1970. They divorce in 1978, remaining firm friends. David was later to become professionally engaged with highly specialised construction work for the new buildings in Pishwanton Wood. Margaret never re-married and following her divorce, she assumed a new family-related surname, Colquhoun. In 1979 Margaret worked in a pioneering Camphill Village Community in Austria. Her empathy for individuals with learning disabilities later found positive expression in a special needs provision of day-care activities in Pishwanton Wood. This Camphill experience furthered Margaret's interest in anthroposophy and after returning to Scotland she was soon to become involved in initiating anthroposophically related outreach activities in Edinburgh, e.g. Helios Fountain in the Grass Market. Between 1980 and 1982, she initiated and ran several social enterprises in the Edinburgh area, based on the sale of biodynamic produce, crafts and books relating to alternative life style, which were distributed to various retail outlets. Her influence also figured in the conception of the Peter Potter Gallery in Haddington.

A head injury in 1982 was to become the most decisive turning point in Margaret's professional life and destiny. Following a protracted stay at Park Attwood Clinic, Worcestershire, and a subsequent conversation with her friend Reverend Pearl Goodwin (also a former student of embryology under Profes-

Waddington), she decided to relocate to Southern Germany to study Goethean Science. Starting in 1984, she spent three years at the Carl Gustav Carus Institute in Öschelbronn, studying under Thomas Göbel and later transferred to the Section for Natural Science at the Goetheanum under its director Dr. Jochen Bockemühl. She returned to Scotland in 1988, to her former small, isolated but romantic stone-built cottage in the village of Humbie, eight miles from Pishwanton Wood. A decade or so later, she moved closer to the wood, to a much larger modern bungalow in Gifford. This new residence served as the main administrative centre for the rapidly expanding activities of the Pishwanton Project. Margaret remained there for the next decade.

Nine years ago Margaret made a further home relocation, to a substantial, stone built former manse, Craigie Lodge. This was once again in an isolated location, and considerably more distant from the wood, situated on the southern border of the Lammermuir Hills in Longformacus. The administration of the Trust then moved to a new property close to the wood, which continues to house co-workers and some volunteers up to the present time. She felt this move to mark the beginning of a process of “letting go” and eventual succession. However, her hopes in this regard have not yet been realized. The financial crash of 2008 put extra pressure on both to Margaret and the Trustees of the Life Science Trust. Even with these mounting difficulties, Margaret felt completely at peace in her new home, despite having to surmount practical obstacles such as managing repeated flood and storm damage. In her final years, she never entirely relinquished a dream of moving to the North-Western coast of Scotland to pursue her own professional writing. It is unfortunate that life did not offer her an opportunity to do this.

From her new home, Margaret continued to oversee developments and activities at Pishwanton, relying increasingly on local voluntary help. She was diagnosed with a serious pre-cancerous bone marrow condition in August 2016, following a period of increasing exhaustion and severe headaches. The medical prognosis was that this condition would most probably evolve into an acute myeloid leukaemia over the course of a year. It was initially hoped that treatment might delay the onset but the leukaemia developed earlier than anticipated in February 2017. Margaret’s life was subsequently prolonged by regular blood transfusions, administered in her local cottage hospital in Duns.

Margaret’s final visit to Pishwanton Wood coincided with a dignified and joyful celebration of her seventieth birthday in May 2017, attended by around sixty friends from all parts of the UK and some from abroad. In the presence of Michael Williams, MBE, Lord Lieutenant of East Lothian, she was able to declare the latest chalet building in Pishwanton formally open. (Michael Williams was himself awarded the MBE for services to biodiversity, conservation and agriculture in East Lothian.) Margaret’s wish was to remain in her home till the end of her life. With substantial help from neighbours, close friends and additional professional support from the NHS, this proved possible. Her energy and capacities declined through the last eighteen months of her life but she was fortunate in being spared acute physical suffering. Her passing was peaceful and, in the moment that it took place, somewhat unexpected. She was buried according to her wishes in the grounds of Craigie Lodge, leaving her entire estate to the Life Science Trust. Her wish was to further the the work of the Goetheanum based Section for Natural Science in Scotland. At present, it

remains unclear how the future of Margaret’s legacy in Pishwanton Wood will unfold. The coming year will be a time of transition and it is hoped sustainable ways forward will emerge.

Dr. James Dyson (written on behalf of the Trustees of the Life Science Trust and the Executors of Margaret’s Will)

Correspondence

In response to Sandra Moore’s article on “Stephen Hawking and Galileo Galilei” (Newsletter September 2017), Jonathan Stedall contributed the following poem from his newly published collection “No Shore Too Far” (Hawthorn Press). For more information on Jonathan’s poems please refer to www.jonathanstedall.co.uk

LENSES

The Elizabethan poet, Edmund Spenser, wrote in ‘The Fairie Queene’ that once a man has missed the way, ‘the further he doth go, the further he doth stray.’

We’ve learnt a lot
in recent years,
since Galileo ground his lens
and saw a mystery in the sky
that now we take as fact.

The danger that we face today
is that the lens through which we looked,
before these tools were made,
will wither, fade
through lack of use
and then we’ll truly stray.

But I believe
that waking up
is what we’re meant to do.
So as we meet along the way
what turns ideas upon their head,
we’ll use our reason,
brains and skills
to polish up that other lens,
and so not miss the way.

Jonathan Stedall



Articles

Learning to See:

Connecting with nature at home and at work

I have been working at a software company in Cavaillon for almost six years now. My company's offices are in an out of town industrial estate. When I first walked to and from the train station, I appreciated the view of the nearby hills of the Luberon, but I thought nothing of the site's trees. I assumed they were commercially grown imports introduced when the site was developed. The trees would, however, become my teachers, helping me to learn to see.

The tracks of an abandoned railway run near to my company's offices. They lead past bush and bramble to a grassy meadow, overlooked by slim, elegant trees. I often come to this spot to take a break from the computer screen and to refresh my thoughts. In summer, I have even taken my lunch there, or enjoyed the quiet solitude to read. The path over the tracks still provides the starting point for my walk to the station.

When I first came to this spot, the meadow was unruly and overgrown. I was delighted when one time it bloomed into a beautiful spray of spring flowers. I loved the sense that nature was taking back the land. A tree sprouting right in the middle of the railway tracks was the most striking symbol of nature's claim. The open space was originally fenced off with barbed wire, but ramblers had broken through to make the pleasant route available to all. This, however, led to disputes over the land. Innocently walking past the nearby factory, the owners came up to me and complained of thieves using the route. They insisted that the route was private, as it passed through the factory's parking lot. Even though they did not directly reprimand me, I felt lumped in with the thieves, as if walking and enjoying nature were suspect. After that, measures were taken to tame the vacant lot. The meadow of grass and flowers was mown and the tree staking its claim to the railway tracks cut down. I was deeply touched by the loss of the flowers and especially that of my symbolic tree. I thought of the words of Gerard Manley Hopkins:

"Oh if we but knew what we do
When we delve and hew
Hack and rack the growing green!"
(*Binsey Poplars*, 1879).

I was sensitive to the beauty and the symbolism of my favourite spot, but more as a global impression. There was one experience, however, that would greatly sharpen my perception and allow me to enter into a deeper relationship with the place. One weekend, my wife and I decided to go walking along a canal that runs parallel to the Rhône river, near to where we live in Avignon. I was wondering what the trees on the bank were. I recognized hawthorn bushes in the understory and above, one tree with pale bark, another with dark, craggy bark. The underside of the former's leaves were pale grey, echoing its bark. The latter's leaves had a distinct point. Checking on the internet back at home and at work the following day, I discovered that the two species were white poplar (*Populus alba*) and black poplar (*Populus nigra*). The trees thus emerged from an indefinite background of "trees on the river bank." Why did the trees "come into focus" at that moment? Why was I able to perceive sufficient detail that their identity became clear? This was not the first time that my wife and I

had walked along the canal. That day, some change in my attention, some awakening responsiveness allowed me to capture the trees in their individuality.

What was different that day? I did not go out with the aim of identifying trees. I did not take a tree guide with me, nor was my head filled with preconceived ideas of what I should see.

In a state of relaxed openness, I allowed my interest to be taken by the two trees that dominated the river bank. Sensitive to aspects of colour, shape and texture, I was able to describe leaf and bark. Craig Holdrege might say that, at least in that moment, I was following Thoreau's advice "Go not to the object, let it come to you," able "simply to perceive that such things are," and that I had achieved "a true sauntering of the eye" (quotations in Holdrege, 2013: 52, 60).

University courses in ecology and vegetation history taught me that poplars were typical riverside trees. This guided my subsequent internet search, greatly aided by the vast dictionary of images available. Learning the lesson of the trees by the canal made me sensitive to what those at work had to teach me. Shortly after my walk along the canal, I realized that the trees populating my favourite spot by the railway tracks were white poplars. The tree that gave shelter to our picnic area, at the hottest times of the year host to hundreds of noisy cicadas, was a black poplar. I now recognized the characteristic pointed leaves and craggy bark.



White poplars (*Populus alba*)

<https://www.uniprot.org/taxonomy/43335>

Suddenly my whole perception of the area changed. I could feel the presence of the nearby Durance river, its influence on the landscape and the vegetation. I saw my company's offices resting in a river basin, surrounded by typical riverside plants. Suddenly able to read the trees on the site, I could read the landscape in a new way; I was able to glimpse the whole in the part (Riegner, 1993: 182). This realization gave me a new sense of quiet and meaning in my favourite place. My deeply felt attachment to the place, developed after so many regular visits, blossomed from impression and sentiment into articulate understanding. The revelation jolted me out of my binary thinking, too. I understood that my workplace could be part of an industrial estate and a diverse river basin. Taking time to see and to allow living nature to appear, overcame the categories and snap judgments that made me believe there was nothing to see. An openness of heart changed how I felt about the place, softening opposition into participation. Holdrege, con-

tinuing his discussion of Thoreau, points out the need for a certain “intention of the eye” in order to see (Holdrege, 2013: 61). Riegner describes how the concept of indicator species opens up an awareness of ecological context (Riegner, 1993: 1823).

In southern France, black and white poplars are typical inhabitants of river margins and banks. The European classification of habitats describe this particular type of poplar forest as “Mediterranean multi-layered riverine forests of base rich soils submitted to seasonal prolonged inundation with slow drainage” (European Environment Agency, 2012). The EEA’s definition increases my awareness of the landscape at home and at work. I remember flooded fields and surface water on the roads in Avignon and Cavaillon when the Rhône and the Durance burst their banks. I see how human settlements would naturally form on the fertile soils deposited by the rivers, despite the risk of flooding in these low-lying areas. Indicator species had furnished me with an important tool for one of my bachelors’ dissertations. On the basis of the plant, mollusc and fish fossils found, I was able to suggest the ecological context at the time and place of a particular fossil bed’s creation. The concept subsequently germinated into true understanding, creeping back into my awareness as an intuition and guiding my internet search for the matching trees.



Black poplar (*Populus nigra*)

https://en.wikipedia.org/wiki/Populus_nigra#/media/File:Populus_nigra-bekes.jpg

The European Environment Agency states that the black and white poplars commonly share habitats with ash, field elm, white willow and alder. I wonder if there are not further discoveries awaiting me, further connections to be made. I have to be careful though. Now I know what I am supposed to see. Now I may go back to the canal, or to the workplace, anxious to find what I am supposed to find (for this “Cartesian curse” see Hanson, 2012). I am feeling the tension that Holdrege describes as inevitable: “Without being open to see something new, we would see the world only through the lenses of our preformed conceptions and experience. But without any conceptions we wouldn’t see anything at all” (Holdrege, 2013:

61). His advice is to live creatively in this tension and to be aware of our choice of concepts. I have felt how certain concepts demand knowledge and abstraction but so often bring only anxiety. Other concepts, like those that helped me see the poplars, express a desire for understanding and appreciation and bring repose.

Let the trees be my teachers still in developing this “living thinking” (Holdrege, 2013: 35).

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Stephen Wood

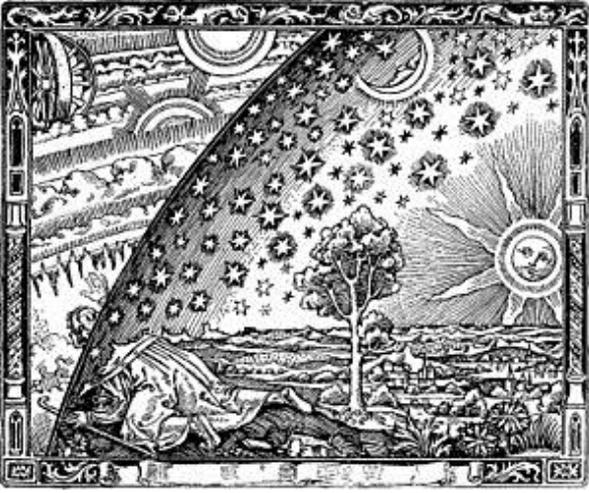
Stephen Hawking and Galileo Galilei

This article continues the theme from previous Newsletters (1) and deals with the deep connection between Galileo Galilei and Stephen Hawking.

Part III:

In his biography of physicist David Bohm, David Peat describes how in childhood Bohm experienced movements in his surroundings in a personal, bodily way (2). The science of “mechanics” was an inner experience for him. Prior to the spread of Galileian-Newtonian mechanics, as outlined previously (1), feelings and experiences of this kind were common and taken for granted (2). However, today it is rare for a practicing physicist to describe phenomena in such personal terms. Galileo taught us *not* to feel movements within ourselves. Whether one considers a human sprinter or a planet in motion, their movements are modeled as being completely external to the observer. They can be measured and compared only to each other, with no reference to the observer making the measurements. Human experience has been removed from consideration and researchers are expected to be dispassionate and uninvolved.

But what does it mean to calculate as a dispassionate observer, who remains inwardly unmoved? This onlooker stance has changed the human relationship to the world. Scientists no longer need to refer to their own experience, to their own humanity. They are trained to be concerned with outer surfaces seen with the eye, or with the magnified eye of a telescope or a mechanical sensor or instrument.



Engraving by an unknown artist in Camille Flammarion's *L'atmosphère: météorologie populaire* (1888), representing a medieval cosmology: a flat earth surrounded by a solid firmament, and a metaphorical illustration of the human quest for knowledge.

The body becomes of little use in this kind of physics. Human bodies become objectified, and regarded in the same way as other moving things, "outside" the human self. The body becomes part of an inanimate world of dead forces, exchanging momentum, pressure, matter and energy. The living, experiencing human being has no place in Galileo's world.

From a spiritual-scientific perspective, such material approaches to human beings, their activities and the bodies they inhabit, lead to a very incomplete understanding of humanity. In Rudolf Steiner's lectures on Karma (3), he indicates that what is done by an individual in one lifetime will return in the next and give a surrounding context to the new individual's striving. Furthermore, the thoughts and world views of one life return as the form and structure of the body in the new life. The understanding of the previous lifetime is carried around in the new self's body. This extra dimension of human existence clearly can not be considered in an entirely material model of human existence.

With this in mind, let us return to the fascinating dynamic between Galileo and Stephen Hawking. It may be suggestive that in 1981, at the age of 39, Stephen Hawking was invited to meet Pope John-Paul II in Rome. The Pope, being of Polish extraction and proud of his compatriot, Nikolai Kopernik (Copernicus), announced that there was no more need for argument between the Church and modern cosmology. Hawking and the Pope then engaged in deep conversation. At the moment they met, the Pope unusually descended from his throne towards the physicist, because it was impossible for Hawking to make the usual gesture of kissing the Papal foot. Perhaps there was more to this event than met most eyes, connecting it to a rather different, earlier encounter between a cosmologist and a Pope: the meeting between Galileo and Pope Urban VIII, three Centuries before. In stark contrast to what happened in the 17th Century, what emerged from the 1981 meeting was an announcement that the Roman Catholic Church, even whilst still struggling to update the views of St Thomas Aquinas about world origins, was now ready to accept the Big Bang theory as a model of Universal origin.

The Big Bang theory and the history of Time are ofcourse a substantial part of Stephen Hawking's work. But like the philosophies of Aristotle, Aquinas and even, to a degree Aver-

roes, the Big Bang is not an empirical idea. No one was there to record it. It is also notable that these three philosophers held the view that Time's origin coincided with the moment the world came into existence. The thinkers of antiquity never conceived as an empty universal flow, where things appeared and disappeared. Time belonged to events. Every event had its own "Time" (as also stated in the ancient book of Ecclesiastes, Chapt. 3 v. 3). And now, after all this time, there was no longer any dispute between the Pope and the Lucasian professor's ideas. So from 1981 onwards it was permissible for Stephen Hawking to speak in his own voice about world creation. The Church no longer wished to silence the voice of science, which now spoke through a machine.



Stephen Hawking and Pope John Paul II, 1981
<https://www.pinterest.com/pin/141793088240771122/>

Since 1905 and Einstein's theory of special relativity, the idea that the sun marks the centre of the solar system changed. The current idea is that the centre is a matter of personal standpoint and therefore relative. Among the extraordinary descriptions or imaginations in the "Brief History of Time", we are introduced to the proposal that the universe is expanding, and has been doing so ever since the "Big Bang". But, says Hawking the strange thing is that the universe is rushing away from us *equally quickly in all directions* Not more in one direction than in another. "It would almost make us feel", he says" (that) we on earth (within our bodies) must in some way be the centre of the universe after all!"

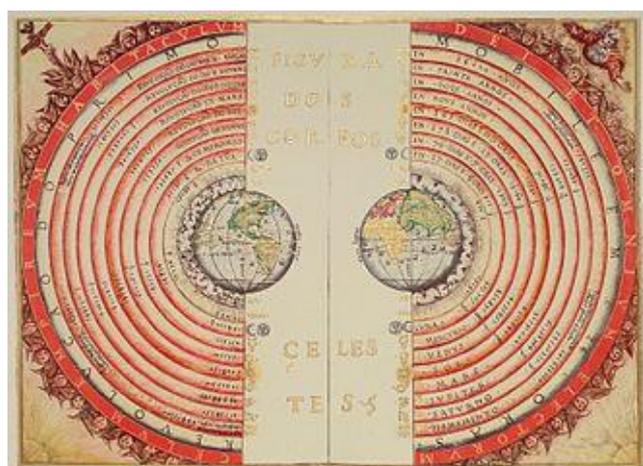
However, Hawking also proposes an alternative possibility: that no matter where an individual is centred, the universe will appear to be receding equally in all directions. That means that everywhere can be considered the centre and, says Hawking, physicists choose this second alternative "on grounds of modesty". For a modern physicist, it is better that every point is thought of as the centre than for there to be a personal centre. This begs the question: is *modesty* a scientific concept? Is *modesty* a moving force in scientific thinking? One should recall that the Church gained opprobrium in the eyes of posterity for marginalising Galileo's book on the two world systems, on the grounds that Copernicanism, which promoted the idea of a moving earth (5), was inconvenient to teach to credulous masses of people. Science could not be permitted to say in the 17th Century that the ground beneath people's feet was rushing along because if that were so, how could anything, even the Church, be secure? Thus it was not purely *scientific* considerations that led to Galileo's silencing but political ones and it

seems it is also not scientific reasons that cause a modern man to renounce the possibility that he and his earth body *are* the centre of the universe or that human beings are, after all the central subject of all science. (Could we call it *false modesty?* ed.)

So it is strange. Science can seem very arrogant and immodest sometimes. However, we on earth are instructed by today's science to see ourselves very "modestly", as an insignificant part of a comparatively tiny planet called "Earth". A speck of cosmic almost- nothingness, on which our body lives like a subatomic particle, in no way special or of any real importance, even to our own kind. This is our duty for the sake of humility and modesty.

However, in opposition to this attitude of human insignificance, who cannot be awe-struck at the incredible courage, stamina and endurance of Stephen Hawking. And what has made it possible his amazing achievements if not his astonishing being, housed in his physical body. Hawking's 76th birthday will have been celebrated when you read this along with his deeds and ideas. In carrying out these deeds of thought and exposition, his feelings have been engaged. He has loved and been loved. Many devoted themselves to him and this is part of the reason that the dictates of scientific and medical infallibility have been proved wrong after all. Dogmatic science has not had the last word in the life of Stephen Hawking. Fatalistic medical prognosis said "two years" but the predicted two years of life have become 55, so far. Hawking and those who have loved him, have recreated time itself, *his* Time, *his* cosmos. He and those close to him made him the centre of their existence. Indeed, in a "relative" world, it makes no sense to talk always about "The Cosmos" but rather one should say "My Cosmos" or "Yours" or "Stephen Hawking's Cosmos". As Goethe said, each of us can have our own true cosmos and these individual "cosmoses" (or should it be *cosmoi?* ed.) come into interaction with each other (6).

Let us imagine Hawking as a centre on the earth. Everything he has said, done or felt can be imagined flying away from earth into space-time in all directions, just as did the deeds of Galileo centuries ago. For example, Galileo's vision of the pendulum in the cathedral at Pisa was an event, an "experiencing" that "flew away" into space-time centrifugally all those years ago. At the "end" of the cosmos it reached "infinity" and like the swing of a pendulum, returned back again towards the place of gravity where the earth is waiting like a tiny point.



Illuminated illustration of the geocentric universe. The text reads "The heavenly empire, dwelling of God and all the selected."

Let us imagine what happens when a human being brings a totally new idea or initiative into the world. It is something unprecedented, like a new birth. Something new comes into the world. Like a "bang" of creation it bursts onto the scenea Beethoven symphony, a Rembrandt self- portrait, or the deeds of a Ghandi or Martin Luther-King. The novelty bursts into the world of the old and mechanical and dying, returning from infinity. This new thing must be active in someone who has so greatly defied the odds and his own individuation, has created his own time. Stephen Hawking is such a man. After all, he has spoken the words of his mind and his destiny and they will speed on their way into the cosmos and one day echo back again renewed; as his cosmos stops expanding and returns again into its centre, its heart.

References

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- (2) F. David Peat. *Infinite Potential. The Life and Times of David Bohm.* Addison Wesley Reading, Mass. (1996). 368 pp. ISBN 0-201-40635-7
- (3) Rudolf Steiner *Origins of Natural Science.* (Dec. 1922-Jan. 1923), GA 326.
- (4) Rudolf Steiner *Karmic Relationships: Esoteric Studies Volume II.* (April 1924-June 1924). Transl. by George Adams. GA 236.
- (5) Copernicus "arrested the sun and set the earth in motion" Traditional Polish dictum.
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Sandra Moore (revised with permission ed.)

Lectures

Plasticity in evolution: The new Lamarckism?

Transcript of a Lecture by Dr. Judyth Sassoon given at the Ruskin Mill Field Centre, Nailsworth, UK. January 2018.

Summary

Charles Darwin's theory of evolution by random variation and natural selection is often taught in opposition to Jean Baptiste Lamarck's proposal, that organisms purposefully acquire new characteristics during their lifetimes, and pass them on to offspring. Although there are many instances in which the Lamarckian model does not work, evidence is accumulating that epigenetic (non-genetic) factors and the interactions of organisms with environment can lead to non-random, directed changes in anatomy and physiology. Over time because of their complex nature, such variations become physiologically selected and fixed into the inherited material, if the environmental conditions persist. The variations are most likely to persist if they occur early in development and have been given the name "developmental plasticity" to reflect the organism's capacity to undergo large-scale, adaptive changes in anatomy and physiology.

The aims in this lecture were to highlight

- 1) How polarities (real or artificial) are set up for pedagogical emphasis.
- 2) How Lamarckism has changed its meaning over time.
- 3) Some recent work showing developmental plasticity: Standen *et al.* 2014 (Nature, 513, 54-58).
- 4) Proposals for a new way of viewing heritable changes from a threefold perspective, stressing an interpretational (semiotic) rather than absolute view of genetic inheritance.

Introduction

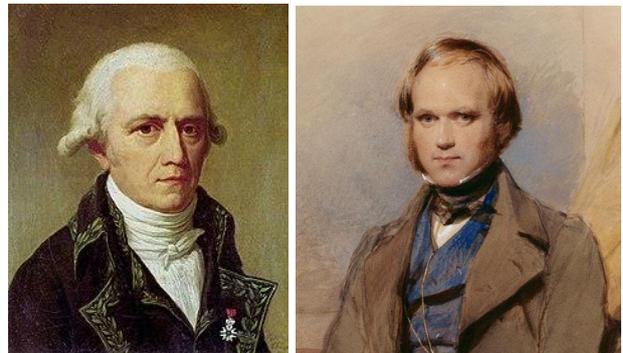
The lecture was delivered to a general audience, but was in part aimed at the employees of the Ruskin Mill Trust (Nailsworth, UK) many of whom are educators, so an important running theme was the use of symbols in education. The ideal of education is to assist someone in their development. Different ways of communicating ideas will always have consequences in structuring thinking. For this reason education has enormous power to create or destroy, to assist development or to inhibit it and the moral burden of an educator lies in the appropriate selection and use of symbols. Historical personalities can be symbolised and presented out of context to reinforce generally accepted ways of thinking. I highlighted the example of Darwin and Lamarck as an artificial opposition set up by neo-Darwinists to reinforce their case (I expand on this later).

Irrespective of their correctness or otherwise, the approaches of Lamarck and Darwin have different symbolic, pedagogical “gestures”: neo-Darwinism is rather “particulate” in its view of “mutation followed by natural selection”, while Lamarckism has a more dynamic quality of “change in flow”. It is also interesting that both Darwin and Lamarck are associated with specific animals, finches (Darwin) and giraffes (Lamarck), though neither scientist discussed these in preference to other species. Finches and giraffes were symbolically imposed after the publication of their major works. (Lamarck is said to have proposed that the neck of the giraffe is long because over generations, the animal stretched its neck to reach leaves growing high-up in trees. Darwin is said to have explained the variation in the beaks of Galapagos finches by saying that variation occurs randomly, and the birds with beaks best adapted for a particular diet will survive). Nevertheless the symbolic connection with these animals is an interesting one. These animals as symbols embody the different perspectives of these two scientists: in folk tradition the giraffe is a tall creature rooted to the ground through long legs, with a bodily movement of far-sightedness in the angle of its head and elongated neck. It symbolises vision into the future from the position of the present. In contrast, birds are traditionally seen as messengers of the gods (or fate), appearing suddenly (apparently “at random”) from the heavens and disappearing just as quickly. So here we have symbols for purposeful action into the future contrasting with random changes in the present.

The opposition of Darwin and Lamarck

Lamarckism and anti-Lamarckism: The meaning of these terms has changed over the last 200 years. From the beginning of the 20th Century, Lamarck’s name was associated with the inheritance of acquired characters, an idea he endorsed but did not claim as his own. During his lifetime acquired inheritance was generally accepted by “transmutationists” and Darwin himself considered it a possible source of some natural variations.

Today, to be anti-Lamarckian means to be “pro-Darwinian” (or pro-neo-Darwinian) and “anti-acquired inheritance”. Lamarck is set up in opposition to Darwin to highlight neo-Darwinian views of random variation. This is a pedagogical trick and reflects neither the real opinions of Lamarck nor even Darwin’s opinions of Lamarck. In his lifetime, Lamarck was far more concerned to promote a transmutational and teleological view of nature. In his view, nature was in a continuous process of refinement, from simple to more complex and more perfect. He explained the simultaneous presence of simple and complex forms by continual spontaneous generation. He also emphasised the importance of context in promoting change, saying that environmentally induced behavioural changes led the way to species change.



Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck (1744 – 1829) (left). Charles Robert Darwin (1809 – 1882) (right).



Giraffe (*Giraffa sp.*) (left) and Galápagos finch (*Geospiza sp.*) (right)

Lamarckism in its original form became associated with “perfecting the imperfect” by changes in behaviour and became a social standpoint. In Britain it represented radicalism, anti-slavery, anti-established church, materialism, social reform and the power of the individual to better oneself. In contrast, anti-Lamarckism meant conservatism, class distinction and belief in a divinely established hierarchical social order. The Bristol Institution for the advancement of Science, Literature and Arts (opened 1823) was an example of an anti-Lamarckian Institute with an anti-Lamarckian scientific ideology. It was a centre of palaeontological research before the foundation of Bristol University or a formal Museum. Amongst its members were gentlemen drawing their wealth from the exploitation of slaves in the colonies e.g. Henry De la Beche and clergymen such as William Conybeare. Both were leading lights in vertebrate palaeontology.



The Building of the Bristol Institution for the Advancement of Science, Literature and the Arts in Park Street (1820s). Photo: Bristol City Museums and Art Gallery

Conybeare worked within a Protestant tradition embracing the natural theology of William Paley as “proof” of a divine creator. At the foundation of the Bristol Institute’s work lay the Great Chain of Being: a static and non-evolutionary (non-transformational) view of natural diversity in which all of creation is arranged in an ascending series, from mineral to divinity, with species in fixed, unchanging positions along the chain. Lamarckism confronted this view and was adopted by working classes demanding a “secular science to destroy the intellectual buttress of Anglican aristocratic power”. Lamarckism supported purposeful change driven by inner forces and by extension denied the validity of social barriers on which 19th Century English Society was built. It was adopted by those who wanted to better themselves and were not content with Paley’s opinion (expressed in “Natural Theology”) that “God’s hierarchical design could be seen in the general happiness and well-being evident in the physical and social order of things”.

Other oppositions

If one favours “teaching by contrasts” it is possible to place William Paley in equal opposition to either Lamarck or Darwin, Paley standing for divine design with adaptations as gifts from God, and both Darwin and Lamarck representing the flow of evolutionary transformation, with adaptations arising by other means.

However, another interesting opposition to neo-Darwinism (but not Lamarckism) was mentioned by Stephen J. Gould in his famous book “Ontogeny and Phylogeny”. It is the placement of neo-Darwinism opposite the ideas of German-Estonian embryologist, von Baer. This opposition contrasts the neo-Darwinian focus on species changes as driving evolution, with von Baer’s emphasis on the importance of changes during development. The two perspectives are radically different in their presentation of variation, adaptation and inheritance. The new discipline of evo-devo is attempting to bring these two perspectives together.

From the neo-Darwinian standpoint, adaptation to the environment from struggle, competition and differential reproduction of genotypes is the main mechanism of evolution, whilst the organic form itself provides the main evolutionary impetus and innovations according to the views of von Baer. Lamarck may be said to fall somewhere in the middle: his teleological ideas might incline towards von Baer whilst his commitment to environmental adaptation veers towards Darwin.

Case study

A recent case study published in the journal *Nature* was then presented in the lecture. It demonstrated how a Senegal bichir, *Polypterus senegalus* (a fish with both gills and lungs) exhibits a high level of developmental plasticity when raised exclusively on land, rather than water. Bichirs in the terrestrial setting walked more efficiently, raised their heads higher and exhibited significant changes in their pectoral girdle skeleton. The abstract from the *Nature* paper is reproduced in full (below). Within the context of this lecture, it provided solid evidence that a large scale revision in evolutionary thinking is taking place, and that a neo-Lamarckian perspective, in which directed changes in anatomy and physiology may contribute to evolutionary changes, is being explored. It suggests that evolutionary changes are perhaps not quite as “random” as we thought.

Abstract: The origin of tetrapods from their fish antecedents, approximately 400 million years ago, was coupled with the origin of terrestrial locomotion and the evolution of supporting limbs. Polypterus is a member of the basal-most group of ray-finned fish (actinopterygians) and has many plesiomorphic morphologies that are comparable to elpistostegid fishes, which are stem tetrapods. Polypterus therefore serves as an extant analogue of stem tetrapods, allowing us to examine how developmental plasticity affects the 'terrestrialization' of fish. We measured the developmental plasticity of anatomical and biomechanical responses in Polypterus reared on land. Here we show the remarkable correspondence between the environmentally induced phenotypes of terrestrialized Polypterus and the ancient anatomical changes in stem tetrapods, and we provide insight into stem tetrapod behavioural evolution. Our results raise the possibility that environmentally induced developmental plasticity facilitated the origin of the terrestrial traits that led to tetrapods. Standen et al. 2014.

DEVELOPMENTAL PLASTICITY AND THE ORIGIN OF TETRAPODS. *Nature* 513, 54-58.



Senegal bichir (*Polypterus*) raised on land and walking.

<https://www.sciencenews.org/article/fish-reared-out-water-walks-better>

Discussion of developmental plasticity

This part of the lecture included the following themes:

- 1) The threefold inheritance system:

It is possible to study different kinds of inheritance: e.g. genetic, epigenetic and behavioural. However, all of these restrict the inheritance system to the organism (the “content”). As can be seen from the work of Standen *et al.* (and others), what is really inherited comes from the relationship between organism and environment. To clarify: if a pattern of behaviour can vary depending on environment (as it does in the case of *Polypterus*) then the stability of environmental conditions must be recognised as an essential part of an inheritance system. The organism can then be regarded as an extended entity, with the inherited system composed of a threefold relationship between organism itself, behaviour and environment. I call this the threefold inheritance system: behaviour is the mediator between the two poles of organism and environment and to look at any one of these alone, limits and fragments the picture.

- 2) The role of the genetic code. Because of its importance in understanding inheritance, the genetic code was discussed. I adopted an interpretational perspective and showed that the code can be seen as similar to some aspects of human memory. For example, in human psychology, memories can be interpreted and reinterpreted and an individual’s relationship to their own memories can change. (As an aside, I mentioned how this can be used therapeutically to help people who continuously “re-live” traumatic memories). A similar view of the genetic code can be taken, namely that the organism at each stage of its development can interpret or reinterpret its own genetic memory by epigenetic means, and the interpretation can shift and change within certain constraints, depending on the context of the environment. Although the organism itself can not immediately “write” anything into its genetic code, reinterpretation can provide sufficient foundation for heritable changes. The heritable changes can become reinforced and fixed over time by consistent behaviour of organism with (or against) environment. So that means that if the shift in interpretation can be retained for several generations, the irreversible fixation of the change into the genetic code probably occurs by stochastic epigenetic processes, repeated over generations.

In this view of inherited changes, the active participation of the organism and environment in the whole process is acknowledged. It differs from the neo-Darwinian approach in that the changes do not need an immediate change in the genotype to provide a higher degree of “fitness” to the organism, nor the prolonged process of competition with less fitted individuals. Changes can take place simultaneously in several organisms and thus large scale changes can happen rather quickly. This interaction of genotype and phenotype is not one of determination, but one of interpretation within the context of a particular environment, which itself provides the context to interpret. This is a highly semiotic view of change and evolution and seems to make sense.

Judyth Sassoon

Conferences and Meetings

Reports

Projective Geometry Seminar Report

The Projective Geometry Seminar on Path Curves and the following Maths and Astronomy Section Meeting at the Field Centre this February were alive with a great diversity of presentations and research reports. A stunning set of geometrical models from Philip Kilner of all the metamorphic transformations derived from the platonic solids and beautiful drawings from Richard Nott playfully constructed from circles around the pentagon formed an aesthetic surrounding for our meeting together.

The geometry of Path curves was practiced as arising from the projective growth measures of various kinds. We also looked at the relationship of this geometry to the empirical field of research on the forms of plant buds. The periodic fluctuations in the lambda values of path curves matched to their silhouettes were first described by Lawrence Edwards. Zoltan Komaromy has obtained modern and low cost technology to gather further data and is embarking on this in Hungary. A large conference on this theme will take place in Romania this summer; and training in collecting bud data will be given then (see Future Events in this Newsletter). Zoltan is also willing to conduct a training session in this country in the Autumn in preparation for a winter of bud observations.

It is to be hoped that this project will take an open approach to all the periodic phenomena of bud form development and change, and not be limited to the phase progression of moon-planet conjunctions, with which Lawrence Edwards identified. Graham Calderwood presented the most substance for the Seminar as he has been involved in the work for several decades now. He has created a wonderful set of interactive seminars, recently updated, which can be found at http://budworkshop.co.uk/bw_tutorial.htm.

Oliver Conrardt gave a talk on the stimulus which projective geometry gave to Paul Dirac the quantum physicist and theorist. Dirac joined Professor Baker’s Saturday tea parties in Cambridge in the early twenties and Professor Baker was working on a six volume work on projective geometry. Heisenberg visited Cambridge to lecture on Matrix Mechanics at this time and Dirac was encouraged to write a paper on q and c numbers, the former of which are non-commutative i.e. they do not follow ordinary mathematical laws. Matrices were one example of q numbers but Dirac had no picture of what these numbers could mean in the context of physics. Later Dirac described how projective geometry supported his venturing into the new field of mathematical physics. In his own words: “projective geometry was a most useful subject for my research”. He translated the results he gained through geometry into algebra so they could be understood by physicists! Baker’s large work also derives an algebraic approach to geometry – for example Desargues’ theorem, which we enjoyed proving by purely geometric imagination. This algebra takes on forms like the Pauli and Dirac matrices presented in quantum mechanics.

This short historical survey illustrates the role of projective geometry in developing fluid thinking and how this support new ways of exploring the phenomenal world.

It was interesting to note that there are several theoretical models in geometry, maths and morphology which can meet the phenomenological scientific work, The platonic solids and related forms with curved faces developed by Eva Wohlleben can be related to seed forms as well as crystallography, the path curves and their various configurations can be found in bud forms, leaf shapes, water forms and many organs in the organic world. In a world where fields often become more specialised and separate, the universality of the geometry and the phenomenology enable these separations to be overcome.

Looking ahead to next year, geometry events are planned for February, 2019.

Introduction to Projective Geometry, 19th -22nd February 2019. Seminar looking at George Adams Universal forces in Mechanics 22nd - 24th February, 2019. Further details to follow next Newsletter, or contact Simon Charter: simon.charter@live.co.uk, 01453 882114.

Alex Murrell and Simon Charter

Future Events

Creating forms for flow in a conversation with water. A teo day workshop at the Old Mill, Chalford, Gloucestershire. May 12th, 13th 2018. We will engage with flowing water at the millleat and stream, and perform table top experiments. We will also shape a clay surface with water flowing over it. For more information and booking, contact Simon Charter, 01453 836060. simon.charter@live.co.uk

The Natural Scientific Foundations for Understanding Humans as Autonomous Spiritual Beings –A seminar at the University of Westminster, London Friday 8th and Saturday 9th June 2018 with Prof. Peter Heusser, Prof. David Martin, Prof. Gene Feder and Dr David McGavin.

Organised jointly by the Medical and Science Sections of the School for Spiritual Science

Peter Heusser will give a series of contributions based on his book *Science and Anthroposophy* (see page 12 of this Newsletter): David Martin will give an overview of related to Anthroposophical Medicine on the Continent and Gene Feder and David McGavin will describe two research projects in the UK.

Preliminary programmes: Friday evening 8th June 2018

7.00pm Welcome Dr Michael Evans
7.15pm Introduction Prof David Martin

7.30pm Epistemology and Scientific Foundation for a Medicine including the Spirit - Prof Peter Heusser
8.45 Close

Saturday 9th June 2018

9.30am Chemical Explanation of Life and Biology - Prof Peter Heusser
10.45am Coffee Break

11.15am Overview of International Scientific Research of Anthroposophic Medicine - Prof David Martin
12.15pm Small Group Digestion and Discussion
1.15pm Lunch
2.30pm Harvesting Questions
3.00pm Research in the UK connected to Anthroposophic Medicine - Prof Gene Feder and Dr David McGavin
4.00pm Tea
4.30 Does the Brain Give Rise to Consciousness - Prof Peter Heusser
6.00pm Questions, Plenum and Panel Discussion
7.00pm Close of Seminar

The cost of the seminar is £120 including teas and coffees. Lunch on Saturday can be purchased at near-by restaurants. Please make cheques payable to Anthroposophic Doctors Training and send to Dr Michael Evans at Rock Cottage, Main Road, Whiteshill, Stroud, Glos. GL6 6JS.

Contact & Enquiries Dr Michael Evans
email: michaelrevans@btinternet.com

The Vortex of Life Seminar. 23rd to 27th July, 2018. Lipova, Arad County, Romania.

Form and growth from the point of view of projective geometry. Experimental set-ups and theoretical considerations.

Day 1 (Monday, 23rd of July)

Time	Activity/Presentation	Lecturer/Moderator
7:00 – 7:30	Breakfast	
7:30 – 8:00	Introduction	Cădărean Ioan and Florin Secoșan
8:00 – 9:30	Projective geometry foundations revisited. Relationships to senses.	Graham Calderwood
9:30 – 9:40	Q&A	
9:40 – 9:50	Break	
9:50 – 11:20	Tutorial on Bud Workshop. Part 1	Graham Calderwood
11:20 – 11:30	Break	
11:30 – 13:00	Tutorial on Bud Workshop. Measuring a real bud. Part 2	Graham Calderwood
13:00 – 13:50	Lunch	
14:00 – 14:20	Organ and Vocal Music	Andreea Bodroghi
14:30 – 16:00	Gathering Data: How can one get a consistent series of bud photos suitable for the Bud Workshop? Sharing experience and setting guidelines. Part1	John Byrde
16:00 – 16:10	Break	
16:10 – 17:40	Gathering Data: How can one get a consistent series of bud photos suitable for the Bud Workshop? Sharing experience and setting guidelines. Part2	John Byrde
17:40 – 17:50	Break	
17:50 – 19:20	On my Raspberry Pi mini pc, bud photography and 3d photogrammetry scanning project	Zoltán Komáromy
19:20 – 19:30	Q&A	
19:30 – 20:30	Dinner	
20:30	Free discussions	

Day 2 (Tuesday, 24th of July)

Time	Activity/Presentation	Lecturer/Moderator
7:30 – 8:00	Breakfast	
8:00 – 9:30	The limits of projective geome-	Graham Calderwood

	try. Linear to rotary projective transformations. Applications to fluid dynamics.	
9:30 – 9:40	Q&A	
9:40 – 9:50	Break	
9:50 – 11:20	The archetypal nature of water in flow and how it relates to the growth measure.	Simon Charter
11:20 – 11:30	Q&A	
11:30 – 11:40	Break	
11:40 – 13:10	Energizing water through dynamic and static treatment. A design inspired by projective geometry and bud research.	Jan Capjon, PhD
13:10 – 13:20	Q&A	
13:20 – 14:20	Lunch	
14:30 – 14:50	Organ and Vocal Music	Andreea Bodroghi
15:00 – 15:30	Experimental results of water static treatment. Disruptive sciences.	Benny Johansson, PhD
15:30 – 15:40	Q&A	
15:40 – 15:50	Break	
15:50 – 17:20	Water Treatment System by Holistic Harmonization	Alain Trifot
17:20 – 17:30	Break	
17:30 – 19:00	Call for Papers	All
19:00 – 20:00	Dinner	
20:00	Free discussions	

Day 3 (Wednesday, 25th of July)

Time	Activity/Presentation	Lecturer/Moderator
7:30 – 8:00	Breakfast	
8:00 – 9:30	Projective geometry and time. Continuous motion. Projective waves. The phase shift and the possible independent time stream of the buds.	Graham Calderwood
9:30 – 9:40	Q&A	
9:40 – 9:50	Break	
9:50 – 11:20	Practical session involving senses and geometrical exercises.	Pat Toms
11:20 – 11:30	Break	
11:30 – 13:00	The Field of Form. What underlines projective measures. Form and number. Etheric influences versus forces.	Pat Toms
13:00 – 14:00	Lunch	
14:00 – 14:20	Organ and Vocal Music	Andreea Bodroghi
14:30 – 16:00	The projective growth measure and horsetail (<i>Equisetum</i>)	Frank Schäfer, PhD
16:00 – 16:10	Q&A	
16:10 – 16:20	Break	
16:00 – 17:30	A Vedic interpretation of growth rhythms of rowan and ash buds photographed during the winter of 2017-18	Brian Ragbourn, PhD aka Brigunath) Skype conference
17:30 – 17:40	Q&A	
17:40 – 17:50	Break	
17:50 – 19:20	Perspectives on the etheric and the physical - the meeting of two very different realms in the color-force of Peach Blossom.	Howard Pautz (Skype conference – tentative)
19:20 – 19:30	Q&A	
19:30 – 20:30	Dinner	
20:30	Free discussions	

Day 4 (Thursday, 26th of July)

Time	Activity/Presentation	Lecturer/Moderator
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8:00 – 9:00	Breakfast	
9:00 – 10:30	The open questions of http://www.considera.org/downloads/	Graham Calderwood and John Byrde
10:30 – 10:40	Q&A	
10:40 – 10:50	Break	
10:50 – 12:20	The golden configuration. Dodecahedron and icosahedron.	Paul Courtney
12:20 – 12:30	Q&A	
12:30 – 13:30	Lunch	
13:40 – 14:00	Organ and Vocal Music	Andreea Bodroghi
14:10 – 15:40	Golden ratio in plant forms and planetary orbits.	Paul Courtney
15:40 – 15:50	Break	
15:50 – 17:20	A short report on my research. Various contributions in relationship to some of the previous presentations.	Florin Secoşan
17:20 – 17:30	Break	
17:30 – 19:00	Call for Papers	All
19:00 – 20:00	Dinner	
20:00 – 21:00	Retrospectives and Prospectives. The Vortex of Life Second Seminar.	All

Day 5 (Friday, 27th of July)

An excursion to Transylvania and an introduction into the history of Romania.

The cost/day/person of 40 euros consists of 10 Euros for booking of the seminar room(s) (it includes all needed equipment - black/chalk board + projector&screen + WiFi internet connection), 5 Euros for breakfast, 15 Euros for lunch and 10 Euros for dinner. There are 4 days of conferences.

This cost does not include accommodation.

For further information please contact florin.secosan@gmail.com

Experience Colour: The Art and Science of Teaching Colour. 30th and 31st August 2018 at the Glass House College Stourbridge DY8 4HE.

A conference for teachers, parents and anyone interested in an educational approach to colour.

Experience Colour is an international exhibition, created by colleagues from the Research Institute at the Goetheanum in Switzerland, and provides a hands-on opportunity to see and learn about colours in a full range of natural and experimental situations. The exhibition will be open at the Glass House College in Stourbridge from August 28 to October 14 2018

offering teachers a perfect opportunity to engage their students in an amazing experience of discovery and learning through colour.

The Teachers Conference will be held August 30 and 31, to give teachers an opportunity to explore the different aspects of the exhibition in depth, with expert guidance, and to experience in particular the natural symmetry, polarity and complementarity that can be discovered in colour.

The conference will be of special interest to all Waldorf teachers as well as to those specializing in Art and Science. It is a splendid example of the open scientific attitude which is a unique feature of the Waldorf Curriculum.

It is an opportunity to practice ways of thinking that retain a direct connection with our sensory experience, as is the original meaning of the word *aesthetic*. It will also provide a context to the central importance of Goethe in the pioneering phase of Rudolf Steiner's work.

We hope that colleagues and groups of colleagues will be able to come to this unique event. Concessions are available for groups and individuals. (Via the Steiner Schools Fellowship Website : <https://www.steinerwaldorf.org/steiner-teachers/professional-development>)

We are hoping that schools support attendance of the event with their teacher training and professional development budgets.

Contact: For further details or to book a place please email ifg@rmlt.org.uk To find out more please visit the website www.experiencecolour.org

Steiner Forschungstage—Steiner Research Days 28th–30th September, 2018 at the Glasshouse, Stour- bridge.

Since 2005 a group of students and young academics have been meeting twice a year to discuss how to do research on Steiner in a way that has academic rigour on the one hand and an openness to the ideas of Steiner on the other. These gatherings have been primarily for presenting research projects relating to Steiner and discussing research methods. A common characteristic has been mutual interest for other people's research as well as openness for undogmatic and critical thinking. The next meeting will be held at the Glasshouse in Stourbridge. This meeting will coincide both with Michaelmas and the *experience COLOUR* exhibition, designed in Dornach by Matthias Rang and Nora Löbe. Therefore, although there will be a wide range of presentations, we will be focusing on the topic of colour and the transformation of our scientific worldview.

www.experiencecolour.org
www.steinerforschungstage.net

All are welcome. Entry is free.

To register or more information contact:

Troy Vine: drvine@gmail.com

Events at the Goetheanum, Switzerland 2018

There are the conferences and events planned by the Science Section throughout 2018, in both English and German.

For more details see
<http://www.forschungsinstitut.ch/en/conferences-colloquia/conferences-events/>

Projective Geometry in Brighton

A small group meets weekly in Brighton, currently on Mondays, to study projective geometry as an example of pure (i.e. sense-free) thinking and as a model for physical and living forces.

Please contact Paul Courtney on:

44 (0)1273 382789 (landline)

44(0)7903 961390 (mobile).

Email: paulr.courtney@live.com

Projective Geometry in Gloucester/Bristol area

We would like to start a regular group practicing projective geometry for teachers and others interested. Please contact Simon Charter to register interest.

(email. simon.charter@live.co.uk, tel. 01453 882114).

Grants

Science and Mathematics Group Funding: Call for Applications

We are pleased to announce that small grants are available to members of the Science and Mathematics Group. We can contribute to projects and travel costs (e.g. to conferences). Please contact the treasurer Simon Charter, with a brief proposal outline and a breakdown of costs.

simon.charter@live.co.uk, 01453 882114.

Publications

Review of “Anthroposophy and Science” by Peter Heuser

“Anthroposophy and Science” is a remarkable state-of-the-art milestone in exploring the relationship of natural science with spiritual science as originally represented by Rudolf Steiner (1861-1925). The book reflects the author's a high standard of scholarship and reviews the latest concepts in physics, chemistry, biology, genetics, medicine, neurobiology, psychology, philosophy of mind or cognitive science, anthropology and epistemology, all in their relationship to anthroposophy. To write an up to date overview of one of these fields is a significant task, but to provide a comprehensive overview of them all is a magnificent achievement of a very high order.

The reductionist materialistic world view not only characterises conventional natural science, but our current whole world culture and understanding. To penetrate this thinking and really explore alternatives I found exciting and even disturbing! I became aware of how deep this reductionist science sits in my own consciousness, in spite of 50 years study of anthroposophy.

The fundamental realisation expressed in Steiner's Philosophy of Freedom, is that world reality meets us through the combination of sense perception and thought. A modern philosopher Nagel points to the realisation that the world is intelligible and includes human beings with intelligence. (*Nagel, T. 2012 Mind and Cosmos. Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False. Oxford University Press, Oxford.*) So intelligence has a double part in existence. The realisation that the universe is lawful and potentially understandable is implicit in ordinary science. So thought and the

laws of nature are part of the natural world. Thought itself is not a physical object. Steiner equates thought, intelligence and spirit. In which case we can say that spirit is the foundation of the material world and every layer of existence including the phenomena of life, sentient beings (animals) as well as human beings who think about the world.

As the starting point of knowledge (epistemology) is thought and perception, theories of sensory physiology or neuroscience have no primary role in epistemology, as they are themselves the products of thinking and sense perception. Neither can atomic theory be assumed to be a primary reality, (based on non-perceptible atoms) which often used in science as a basis for rejecting the prime reality of perception.

A fundamental and recurring theme of the book is the way Peter Heuser considers the various levels of complexity in the world. He points out that with higher levels of complexity new characteristics and lawfulness emerge which would not be predictable from the most complete knowledge of the characteristics of the constituent parts. Indeed many of the characteristics of the parts disappear or are “sublated” in the more complex structure. The simplest physical and chemical example is water H₂O a combination of hydrogen and oxygen. Detailed knowledge of hydrogen and oxygen he says would never lead to a prediction of the characteristics of water and the laws of hydrodynamics. So the qualities of water cannot be reduced to the qualities of its component parts in spite of the fact that without hydrogen and oxygen water could not exist.

At a more complex level proteins in living organisms although composed of a series of amino acids, have characteristics which cannot be extrapolated from knowledge of the amino acids and their sequence. For example their tertiary structure which is critical to their functioning as enzymes cannot be predicted from the amino acids and their sequence alone. So on the one hand, new properties emerge – the concept of *emergence* and on the other the properties of the components to a significant degree submerge or are *sublated* in the qualities of the new structure and its functioning.

Historically a Swiss Physician Troxler 1780-1866 (Beethoven’s physician) observed that behind the sense perceptible phenomena of life was a real but not directly perceptible something, behind feelings a real not directly perceptible soul (Seele) and behind human self-conscious thought a real not directly perceptible spirit (Geist). He attempted to sketch out a medical anthropology that would understand development, physiological functions and pathological processes as not simply physical interactions but as the expression of a harmonious or disharmonious interaction of material-physical, bodily-living, soul and spiritual forces in an organ or organ system. He went on to predict that in future a new sense was needed to develop, for the reality that stands behind life phenomena and the development of cognition of soul and spirit. He called such cognition anthroposophy as distinct from anthropology. A name with Steiner would subsequently use for his perceptions and researches. Troxler gave an opening address at the opening of the University of Bern where he became the first professor of philosophy. Biographically, I found it interesting that Peter Heusser shared one of the first chairs in Integrative Medicine with responsibility for the subject of Anthroposophic Medicine at this same University of Berne.

The work is referenced as expected of an academic publication and points to advances in natural science that make sense of

many of Steiner’s puzzling statements as well as the many way anthroposophy can holistically contextualise and make sense of the findings of natural science. It also provides a rational and philosophical framework that can integrate conventional and complementary approaches to medicine.

Michael Evans

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Next Issue

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