

Science Group of the Anthroposophical Society in Great Britain

Newsletter – September 2015

Contents

Nick Thomas	1
John Blackwood.....	2
Announcements	2
Article: <i>Alexander Murrell</i>	3
Meetings	5
Publications.....	7
Membership, Next Issue.....	8

An appreciation of Nick Thomas's scientific work

Shortly before Nick crossed the Threshold on 1st April 2015, he expressed with his customary enthusiasm that some of the mathematical surfaces he had devised had been printed using the new 3-D print technology, and indeed one such shape was on display at the celebration of his life and work at Steiner House on 13th June. His interest in geometrical shapes and surfaces had its origin in the projective geometry of Lawrence Edwards, in which Nick collaborated, and continued after Lawrence's death. This linked with his interest in the flow forms of John Wilkes (with whom he also collaborated), and the growing conviction in those circles that the *shape* of the surface over which water flows can enhance its life-giving qualities. Nick extended this idea of geometrical movement into other fields, and his great quest was to find a form which could neutralise radioactivity, thus solving the problem of radioactive waste disposal. Sadly this ambitious aim is not yet realised, but Nick has set an example of original thinking motivated by concern for the earth and humanity.

Nick trained as an electrical engineer in the RAF, where he served for 16 years, achieving the rank of Squadron Leader.

Although Nick's main area of research and study was mathematics and geometry, particularly projective geometry, he was deeply interested in all aspects of science and the philosophy of science. In this respect he was an exemplary anthroposophist in the width of his interests, and the depth of his knowledge. He particularly loved astronomy and cosmology, and even well before the days of smart phones and tablets, he used to carry around with him a Psion Organiser (the earliest pocket computer), programmed with the orbits of all the planets, so that he could within seconds calculate the position of the stars and planets at any point in history.

In 1979 Nick co-founded (along with Howard Smith, Hedley Gange, Ron Jarman, Alan Hall, and Robert Kersey-Green) the Science Group of the AS in GB. He was an unfailing supporter of the Science Conferences which ran for many years, usually contributing his latest research in projective geometry. Likewise, he supported *Science Forum*, a magazine published by the Science Group. Of the 10 issues which were produced, Nick contributed to 8 of them, sometimes with short reports, sometimes with substantial articles, some of which were accounts of the lectures he gave at the Science Conferences.

For reference, here is a list of the *main* contributions he made to Science Forum (in addition to various other reports he wrote):

Issue 1 (Winter 1979): Summary of a lecture on Spencer Brown's 'Laws of Form'. G. Spencer Brown was a distinguished academic and polymath who worked with Russell and Wittgenstein. Nick says of his book, 'He has produced in his *Laws of Form* what is possibly the most fundamental arithmetic and algebra imaginable, applicable alike to logic, electron-

ics, mathematics, philosophy and other widely varied subjects'. Nick's account links this work to Goetheanism.

Issue 2 (Winter 1980): Article entitled "The Role of Thinking in Science". This was one of Nick's great themes: the fact that thinking is interwoven with the cosmos, and therefore any theory which excludes the thinker must be incomplete, a theme which we find also in David Bohm's work, where consciousness is seen as a part of nature.

Issue 4 (Spring 1983): "Flowform Rhythms". Here Nick presented his research on the rhythms of flowforms, measured with a depth probe. He discovered that the rhythms are more complex than one might expect by simple observation of the main pulsing frequency. There are secondary components, but these can be controlled at the design stage. This is a fine piece of original research.

An update to the flowform research appeared in *Issue 5 (Spring 1985)*, authored by Nick Thomas and John Wilkes, with whom he collaborated in the ongoing water research for many years.

Issue 6 (Spring 1986): 'Generalisations, Universals and Science'. Here Nick demolishes 'induction' as the often-claimed basis of science, the problem being that the method of induction can only be proved by induction! This would reduce science to faith. But, says Nick, we can choose to base science on concepts, without involving induction. Since concepts are a part of reality, we do not need any metaphysical constructs. This approach leaves the way open for wider concepts, leading to a spiritualised science.

As an aside, Nick offered an article to *New Scientist* along the lines of the above. They were at first extremely supportive of a 'new' science writer, but all that changed when they actually read it, much to Nick's disappointment.

As an anthroposophist Nick was naturally interested in Steiner's scientific lecture courses, and some will remember with fondness the Science Group meetings to try and work through these courses. I recall one such weekend meeting to work with the *Warmth Course* at Wynstones School, in the depths of winter, where we all had to wrap up warm! We tried one experiment outside, in which an ice lens is used to focus the rays of the Sun to heat up some water, but even a simple experiment like this is very difficult to execute successfully.

It is very difficult to do justice to Nick's scientific work because of the widths of his interest, but perhaps at the centre of his endeavour is the wish to objectively understand Steiner's many scientific indications, and to pursue the indications of Steiner and George Adams that 'counterspace' held the key to a new holistic understanding. This approach, studied through projective geometry, proved to be fruitful far beyond Nick's original expectations, throwing light on gravity, time, the nature of light, matter and the ethers.

His findings are presented in his book *Space and Counterspace* (2008). This is written in plain English with a minimum of mathematics. However, Nick preceded this with his *Science between Space and Counterspace* (1999), which explains the rigorous mathematical basis of his findings, thereby enabling mathematicians of the future to follow his methods.

In addition, some of his ideas on Time, in a non-mathematical form, can be found in *The Golden Blade* 2009.

Nick was an accomplished lecturer and communicator, clear and concise, always humorous, with an unparalleled grasp of his subject. Even when his audience didn't understand the

mathematical concepts he used, they were nonetheless impressed by him as a truly original researcher.

Finally, it must be mentioned that Nick employed the medium of science fiction to explore some of his ideas. In his last work, *Exploits in Time*, we have a collection of ten short stories which play with time in its different aspects: time travel, time loops, reincarnation. Here we find a sprinkling of many anthroposophical concepts, plus Nick's theories on poltergeists; the importance of geometric shapes and surfaces; time paradoxes; links between ancient civilisations and the present; plus incredibly inventive theories involving the nature of Noah's Ark and the Ark of the Covenant! An entertaining read which underlines the versatile and original nature of Nick Thomas.

Howard Smith

Remembering John Blackwood

John Blackwood, geometrician, teacher, engineer, student of anthroposophy and the natural world, and good humoured friend, left his physical body on 29th July 2015. Although he spent his married life, worked and taught in Australia, John spent his first 22 years in England and maintained a strong connection with the UK through his work with geometry. I met John while studying with Lawrence Edwards in Scotland. He had been a great support for Lawrence, both in duplicating plant bud and planetary rhythm research, and in helping elucidate other aspects of the inherent geometry in the natural world. In the last few years when John made great efforts to attend the geometry conferences in the UK, especially the last one where Nick Thomas could still be with us, he did this partly to be with like minded souls here, and partly to share, with those who could do something with it, his understanding of the way path-curve geometry can be seen working differently in the four kingdoms of nature. He has elucidated this for all present and future students in his book *Geometry in Nature*. The book, however, is more than this as it begins the task of developing consciously a language whereby natural form can speak to us. This shows a special aspect of John's life and work; he loved the natural world but wanted to make it intelligible as well as wonderful. He wanted to bring together the phenomenological approach of Goethe with the mathematical of George Adams, Lawrence Edwards and others. He has laid down some very good foundations in this realm which I trust will be built on in the future. In a public interview in 2011, he lightly suggested he might have been a bricklayer working on one of the great cathedrals one or two incarnations back. There is a task to see the world of nature as a dwelling of the divine world, it seems to me John has been a significant engineer and bricklayer in building this cathedral. He will be greatly missed.

Simon Charter

Announcements

Natural Science Section Initiative Collaborative Work Programme (2015-2024)

Further to the discussions and conversations we had last year regarding ways to support one another and strengthen the Natural Science Section work in the UK, we here outline a proposed framework. We see it as a flexible and participatory structure to strengthen our collaborative work.

Background In November 2014 at Elmfield School, Stourbridge, a collaborative research initiative was presented at the Natural Science Section meeting. The proposal was geared towards sharing practice and 'gathering strings of research activities'. The initiative also sees itself connected to the Natural Science Section Conference in Dornach, *Evolving Science*,

which will take place in September 2015 (see page 6). The proposed collaborative work programme will form a framework of meetings or conferences collecting streams of work in related fields and involving smaller or wider groups of people. This will be steered towards a celebratory event in connection with the 100th anniversary of the foundation of the School of Spiritual Science in 2024. Since its inception, spiritual scientific work has been conducted by outstanding individuals inspired out of anthroposophy and the School of Spiritual Science. Names such as George Adams, Olive Whicher, Lili Kollisko and Lawrence Edwards immediately spring to mind. This initiative seeks to build on the dedicated work of the past, link this to the current research activities and provide coherence towards a collaborative future.

Proposal for Initiating a Collaborative Work Programme In order to shape our work effectively we propose a structure of three 3-year projects. What we propose for this year (2015), is a modest beginning, a collaborative dialogue with the Goetheanum and a UK meeting in November. This will lead to co-shaping a first 3-year step of collaborative work programme from 2016-2018.

A modest start and project co-shaping (2015) For 2015 we will start linking thematically the work of researchers. One such theme, that of 'morphological thinking' has already formed itself and a series of seminars are now planned throughout the year (see under 'Meetings', page 6). Here Judyth Sassoon, Troy Vine, Simon Charter and others have already committed. Other strings of themes in collaboration will emerge. If you have research work and activity that you would like to link in with others, you are invited to bring this to the programme. The Field Centre, Nailsworth, Gloucestershire will offer the venue and administrative support for this collaborative work initially for 3 years. We would wish however that events and activities within such a programme would also be at other venues.

Collaborative Dialogue with the Goetheanum – September 2015 We propose to present the Collaborative Work Programme at the Michaelmas Conference at the Goetheanum as a contribution to their theme: 'Evolving Science: Shaping Goethean Science in Relation to Nature, Conventional Science and Society and to Anthroposophy'.

A first three year project (2016-2018) We propose a three year project framework as step 1 with the aim of gathering research activities and initiatives here in the UK. Thereafter a second 3-year period (2019-2021) would then emerge collaboratively. Possibly this second phase would be shaped in collaboration with Dornach and other Goethean initiatives in Europe. The third 3-year project will then lead us right up to the anniversary in 2024. Ideally this would be a harvest of all accomplished work that is done in Goethean science worldwide, to be made available to science teachers, academics and the public.

Collaboration and publication Life presents itself as a continuum and it is hoped that the beholding of this can infuse our collaborative work in Goethean science together. One main aim of the collaborative work programme is that by 2024 the diverse fields of natural science can cohere into a continuous body of understanding through the activity of spiritual scientific research, and that the science teachers of the future have the opportunity to present a picture of nature that is whole and situated, and at the same time contemporary – this is one of our main challenges.

We aim to strengthen our good connections with the Natural Science Section work in Europe, in America and further afield. The aim of the project would be to help each other make the fruits of the work accessible to all those who need it (science

teachers and the public). This means to also collaborate on publications in connection with our 3-yearly conferences.

We look forward to hear your responses to the proposal and any other suggestions for ways to support one another.

Please contact Simon Charter at simon.charter@live.co.uk, Old Mill House, Hampton Lane, Chalford, GL6 8NX

Simon Charter, Aksel Hugo, Simon Reakes and Aoungus Gordon.

Co-translator(s) sought

Are any Science Group members interested in working with me (in a non-pressured manner) to translate at least some of Louis Locher-Ernst's *Mathematik als Vorschule zur Geist-Erkenntnis*?

It is written in quite short sections, mostly about 5 to 10 pages long so it can be approached in bite-size chunks!

I did work as a technical German translator but my German is now rusty and I do have quite a lot of other things on. If I can find a collaborator, we could together agree on something like a page a month.....

If you are interested please contact me at nicky7@ecobiz.co.uk and I will email to you PDFs of the pages with the section headings – for example, 'Mathematik und Musik', 'Metamorphosen des Bewusstseins', 'Hypatia' etc. (these are not consecutive in the book).

You will see where my interest comes from, if you look at my website, <http://humanmathematics.com/>, where you can download a few papers that I have written. 'God be in my heart and in my thinking: towards meta-awareness in mathematics and science' for example. I am actually in the process of re-writing this and including references, but the content as is, is valid.

Nicky Graves Gregory

Receiving the Science Group Newsletter by email?

The Group was started long before email existed and its Newsletter has been sent by post since it was first issued in 1989. A member who would be happy to receive the Newsletter by email has queried the continued issue of a paper version. If you would like to receive the Newsletter by email instead of post, please contact David Heaf: david@ dheaf.plus.com.

Article

The Dynamic Relationships of Inner Planets During an Evening Star Period

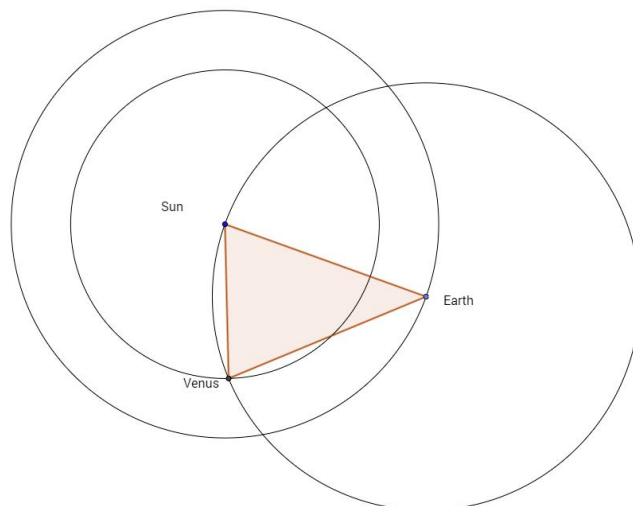
The rise of Venus as an evening star has chimed splendidly with the unfolding of the first half of the year 2015. Both brightness and height will continue to increase as the summer approaches. While enjoying the steady shining of Venus in the twilight and evening hours, we can also add to this appearance a contemplation of the movements and relationships of the planetary bodies. Another more imaginative dimension can thus be added to the appearances, thus widening our view.

On April 30th Venus enters the Sun sphere of the Earth: that means on this day the distance between Venus and Earth equals the distance from Earth to Sun. Remarkably on the same day, Mercury also enters the Sun sphere of the Earth. This is a highly unusual coincidence – I have not yet been able

to estimate when and how often it will repeat; it could be hundreds of years.

Nick Thomas once talked about the equal distances between planets being a kind of conjunction from a counter-space viewpoint. This year three heavenly bodies, and two very dynamic ones, are all equidistant from the Earth.

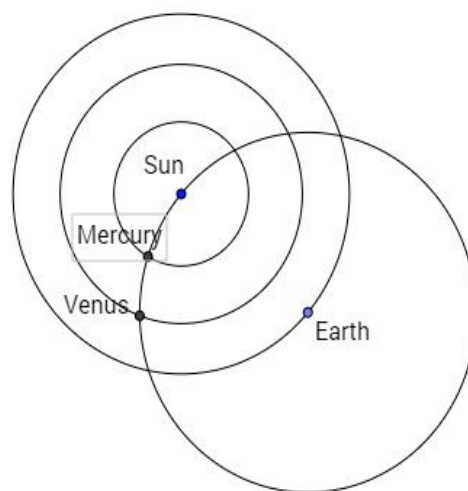
The concept of Sun spheres is a helpful way of overcoming the more abstract nature of a conventional heliocentric view. It is a complementary idea to the idea of an orbit around the Sun, and is closer to our experience from an Earth position.



29th April 2015 22:00 GMT

For those unfamiliar with solar system diagrams, all the movements of the planets are anticlockwise around the Sun.

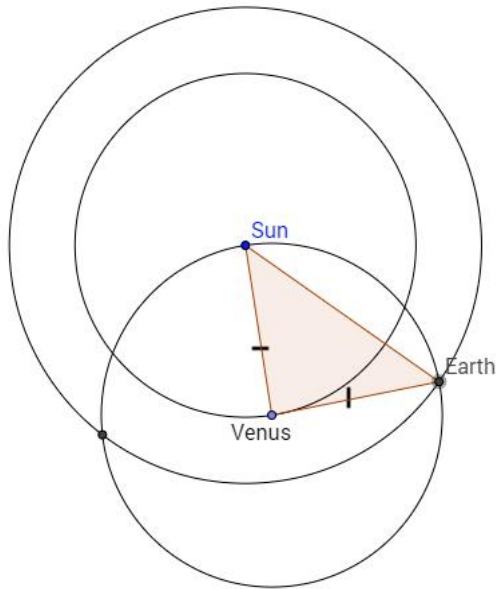
Using ephemerides generated by NASA I have attempted to pinpoint these special conjunction times. Because of the inner flexibility of the movements this is not a simple calculation but I think Venus enters first between 10 and 11pm on April 29th and Mercury enters about 5 hours later so just before



dawn on April 30th.

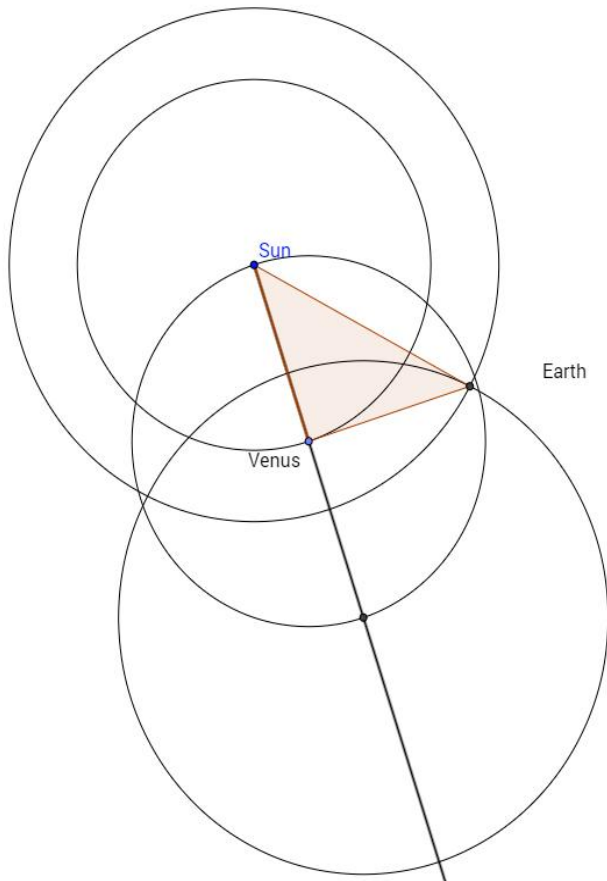
30th April 2015 04:00 GMT: The Earth is equidistant from Sun, Venus and Mercury. The two planets enter the Sun sphere of the Earth

We can also shift planetary perspective if we are interested in the relationship between heavenly bodies. From Venus, the Earth enters her Sun sphere on June 5th at 04:00 hours. At this time Earth-Venus distance equals Venus-Sun distance.



Drawing 3: June 5th Earth enters the Venus Sun sphere.

At 10:00 am the following day, June 6th, Earth-Venus-Sun makes 90 degrees. This corresponds to greatest eastern elongation for Venus from our perspective, and Venus will be longest above the horizon after sunset around this time. The picture is drawn larger so you can see the small change from the previous day's picture.



Drawing 4: Greatest Elongation of Venus from Earth : June 6th
Notice the small gap showing how the Earth is already in the Venus Sun sphere due to the relative movement of Venus towards the Earth and the elapse of one day. The extra line and point are drawn as part of the construction of the right angled triangle and the tangent from Earth to the Venus orbital path.

The Venus body is moving most directly towards the Earth around this time and so the distance between the two planetary bodies is decreasing at the fastest rate on this day. The velocity of approach is around 14 km/second or approximately one million kilometres a day! Such dynamism can be imagined as

we look at the steady rays of our bright evening star especially at the high point of the evening star cycle. Our line of sight to Venus is tangential to the orbit of Venus and so her phase will be 50% at this time.

June 6th is also an anniversary of the transit of Venus in 2012 and so there is a special festive resonance to this year's dynamic events on this day.

I asked myself why these events happened so closely together : the Venus Sun sphere entry, the 90 degree angle and greatest elongation. In 2015 they are especially close.

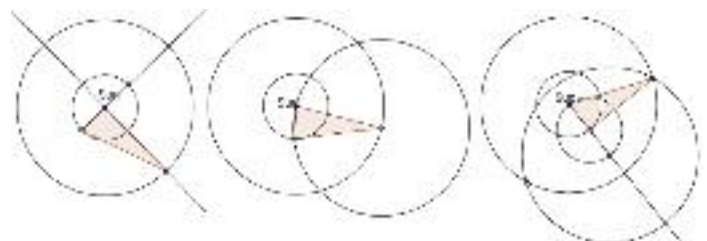
There is variability in the exact timings because of the complicated orbital factors involved, but the 90 degree moment always follows shortly after the equal distances moment. The reason for this is a close approximation of the Venus-Earth orbital radii to the square root of two. (This follows naturally from Pythagoras' Theorem.) The size of the Venus orbit is around 0.72 compared with the earth orbit at around 1. An isosceles triangle with two sides of 0.72 and a longer side of 1 unit is not quite right-angled. To be a right-angled isosceles triangle the proportions would have to be 0.707 to 1 but 0.72 is close enough to make the two triangles follow each other in short succession especially because the situation is changing so fast at this point in the planetary cycles.

As both orbits are elliptical it is possible from time to time that these two astronomical events would happen when Venus is nearest the Sun and the Earth furthest away. For example, when the Venus-Sun distance is 0.718 A.U. and Earth-Sun is 1.0154 A.U. then the Earth would be on the edge of the Venus-Sun sphere at the same moment as greatest eastern elongation. The triangle in drawing 3 would coincide with drawing 4: it would be a right-angled isosceles triangle.

The arrival of the Earth into the Venus Sun sphere – a special kind of conjunction from the Venus point of view – would then coincide with the moment when the distance between the two planets is decreasing at the fastest rate, and with the culminating moment on Earth in the evening star cycle, when Venus reaches her largest angular separation from the Sun.

~ ~ ~

To cultivate mobility of thinking it is good to imagine triangles metamorphosing, and we can extend this exercise by imagining the triangles raying out in space when we are observing Venus or Mercury around sunset. We can then also imagine the metamorphosing triangle to involve the circling movement of the planet as she curves around to her point of closest approach to ourselves (August 15th). We can also gain an impression of the motion of our own planetary body in this changing set of relationships. This is an exercise that seems to me to be simultaneously heliocentric and geocentric.



April 28th 00:00 30th April 04:00 2nd May 20:00 (the additional points are for construction only)

Three triangulations of Mercury, Earth and Sun (times GMT)

The above three triangles are a sequence that repeats regularly for both Mercury and Venus. The proportions in this drawing are for Mercury.

Firstly: a right-angled triangle with the right angle at the Sun. The two planets are square from the Sun perspective.

Secondly: an isosceles triangle representing an event we have called in this article the entering of the Earth's Sun sphere, and a kind of conjunction.

Thirdly: the right-angle is at the planet and so she appears at greatest elongation (and 50% phase) from the Earth's point of view.

It is surprising that this process happens so quickly in the case of Mercury, and this year so symmetrically around the synchronous arrival of Venus in the Earth's Sun sphere.

The maximum velocity of Mercury towards the Earth happens on 30th April at around 11:00 GMT. Several orbital factors, for example a high degree of variability in the orbital radius, make this happen before the moment when the planet is moving tangentially to our line of observation.

The same triangular evolution happens in months rather than days for Venus: this year the dates are March 28th, April 29th and June 6th.

~ ~ ~

What Can We Read From These Details?

Through this kind of study of orbital movements we become aware of the inner dynamism behind the scenes of our observations of the inner planets, and during the steady ascent of Venus as an evening star. A static space geometry becomes alive in time.

Imagining movements, and positions from more than one planetary perspective enhances our experience of the solar system as a rhythmically changing set of relationships, perhaps even as a living organism. Johannes Kepler found the regulating laws of the solar system in this way. He took the time of a Venus zodiacal rotation in Earth years (approximately 5/8) and the time of an Earth rotation in Venus years (8/5): The ratio of these is 25/64 (0,39) which is a close approximation to the ratio of the volumes of the two planetary spheres (0,38). The same regulating principle of time and space applies to any two planets and is still known today as Kepler's Third law.

In anthroposophy the laws of astronomical movements are imprints from the Spirits of the Rotation of Time, which are behind all the laws of nature. Awakening to this spiritual reality behind the astronomical rhythms in which we live mostly unconsciously, comes through awakening to our astral body. Awakening then to our own true being (the ego) will be the same as lifting our self up from the Spirits of the Rotation of Time to an awareness of the Spirit of the Earth.

For behind the Spirits of the Rotation of Time are the Spirits of the Planetary Individualities, just as behind our astral body, there is the ego. 'The task of the Planetary Spirit of Earth is to bring the Earth itself into mutual relations with the other heavenly bodies. The Spirit of the Earth is the great sense apparatus of the Earth through which the earth-planet enters into a right relationship with the cosmos.'¹

An exactly corresponding task in the human realm is to bring our individuality into accord with other individualities.

The Earth is the first planet for which this good task can begin.

~ ~ ~

Just as there is a Planetary Spirit for each planet so we can speak of a planetary body and this too we can investigate.

Only in the twentieth century was it possible to see beneath the cloudy Venus atmosphere and to detect the planet's rotation. Surprisingly this is both very slow and is in reverse direction to the orbital movements around the Sun of all the planets. The length of a day on Venus (243 earth days) is longer than the length of her year (225 days)! One consequence of this is that as Venus curves towards the Earth between eastern elongation (June 6th) to conjunction on 15th August, the face of Venus will turn backwards as if to keep her

gaze attentively on our own planet. It is as if in a dance our eyes are kept on a special partner even as the steps of the dance sweep us by one another. (From a geocentric space perspective Venus follows an elegant looping path at this point in the cycle).

There will be a position somewhere on the Venus planetary body from which the Earth will be directly above, in the zenith. The planet's gaze is as if 'locked on' to the Earth. Throughout the 2 months on either side of the closest point of meeting, this zenith position would be sustained, and brightness would increase continuously until this culminating moment.

In imagination at least, there it would be even more beautiful than the Spring-time evening star period we are currently enjoying. It would be like standing at an Earth pole during the winter months and having the Pole star up above us wax in brightness over several weeks to become even brighter, perhaps twice as bright, than Venus becomes for us at the maximum. For this location the four months would be between sunset and sunrise. If such an observatory existed on Venus, it would be well worth the journey for such an experience!

For Earth dwellers maximum brightness happens a few weeks before conjunction and the phase of the planetary body will be dwindling in the final weeks as Venus disappears into the Sun's light. For Venus this event is entirely a night experience: Earth is opposite the Sun at this central point.

All the Venus phenomena coincide wonderfully with the mythological, spiritual and poetic description of Venus as the Lover of the Earth. In 1821, the English romantic poet John Keats likened the steady untwinkling gaze of the evening star to a hermit maintaining a prayerful task of wakefulness around the shores of Earth.

BRIGHT star! would I were steadfast as thou art—
Not in lone splendour hung aloft the night,
And watching, with eternal lids apart,
Like Nature's patient sleepless Eremite,
The moving waters at their priestlike task
Of pure ablution round earth's human shores, ...²

Source: My attempts to calculate the exact timing of the events described here come from the Horizons web interface:

<http://ssd.jpl.nasa.gov/horizons.cgi#results>

1. The Spiritual Beings in the Heavenly Bodies Lecture 2 in the course given by Rudolf Steiner in Helsingfors 4th April 1912.
2. The poem is the last Keats wrote and is called Bright Star. Only the first few lines are quoted above.

Alexander Murrell, April 2015

Meetings

Water – The Agent of Change?

Steps towards an understanding of the intrinsic nature of water 24th–27th September 2015 at the Field Centre, Nailsworth, Glos, GL6 0QE, UK, with Jennifer Greene and Simon Charter.

Water presents us with some fascinating and wonderful phenomena. Some of these can be seen as archetypal and recur in the fluidity of the atmosphere as well as in water itself. One such phenomenon is the alternating stream of vortices known as the Karman vortex train, or *Virbelstrasse* (in German) a more descriptive expression.

We will study this phenomenon as well as other primal related phenomena in a disciplined exploration, looking for insights into the archetypal nature of water, the gestures of the being of water if you like. We will practise strategic question-

ing which may allow us to discover inner capacities of ourselves (and it should be enjoyable!).

Organised by the Natural Science Section of the School of Spiritual Science in conjunction with the Field Centre

Jennifer Greene has been director of The Blue Hills Water Research centre in Maine USA for 30 years. She runs phenomenological studies into water around the world , works as a consultant to water utilities companies in America and does qualitative water research in conjunction with the Institute of Flow Science in Germany.

Simon Charter MEd, has been working with water landscapes and flowform sculptures for aesthetic purposes and in waste water treatment for 25 years. He is interested in unfolding the educational potential of water.

Cost £200 including all meals and refreshments, but please ask for concessions if you cannot afford this. Please book early.

For more programme details, the booking form, a list of local accommodation etc. please contact Simon Charter at [simon.charter \(at\) live.co.uk](mailto:simon.charter@live.co.uk), 01453 836060, mob 07814 786682

Evolving Science 2015 – Shaping Goethean Science in Relation to Nature, Society and Anthroposophy

30 September–4 October 2015, The Goetheanum, Switzerland.

The Relationship to Nature: Our devotion to the world of the senses—to the earth—is of central importance to science. It therefore contributes significantly to culture, and even to the culture of anthroposophy. Although our current alienation from nature is a necessary step in the development of modern consciousness, we recognise this has serious consequences for nature. In what way can Goethean science develop our connection to nature such that it has significance not only for human consciousness, but for nature as well? How can this development proceed in our age of digital images and global crisis?

The Relationship to Society: Within their respective fields scientists form 'scientific communities' characterised by fact-based, knowledgeable discussion. Science then shapes society through the images that it creates of nature and man, and the technologies that it produces. How can we build a dialogue with other scientists and include their findings in our work with respect and appreciation? And ultimately: what direction will our science take in the task of contributing to the development of humanity?

The Relationship to Anthroposophy: Views on how Goethean Science relates to anthroposophy range from 'they have nothing to do with each other' to 'they are ultimately one and the same'. How can the content of anthroposophy and methodological indications given by Rudolf Steiner be fruitful for our work? How is science supported by meditative work? And vice versa, how is spiritual understanding and development supported by science? Furthermore, Rudolf Steiner expressed the idea that new social forms result out of the nature of scientific thinking: How we think determines how we will live together in the future. We hope that through this event an impetus for the further development of anthroposophically oriented science will arise. In this, we want to work with you and thank all those who have already contributed feedback and suggestions to make this conference possible.

Keynote speakers: Frederick Amrine, Wolter Bos, Craig Holdrege, Johannes Kühl, Diana Pauli, Bernd Rosslenbroich, Martin Rozumek, Wilfried Sommer, Johannes Wirz.

Of the 18 working groups, the following will be held in English or in English and German: The unknown world of microbes – Masters in metabolic processes in all realms of

nature. The potential of Goethean science in the 21st century – reasons why modern life sciences and Goethean science are approaching each other. The significance of Goethe's theory of colour in science and philosophy today. Quantum physics – is there a way to speak about it with non-specialists? Goethean psychology – the observation of the inner life. Water phenomena. Experimentation as an element of a path towards spiritual insight in chemistry. Plant development and the path of the scientist. Picture forming methods – copper chloride crystallisation, rising pictures, drop picture, morphology of algae. A practice-based workshop for the development of etheric and astral perception. Effect of metals on the fragrance of plants and imaginative thinking.

Booking closes: Wednesday, 16 September 2015

Conference fees: regular price: CHF 270 (early bird: CHF 200), with meals: CHF 420 (early bird: CHF 350) with sponsorship: CHF 380, with meals: CHF 530. Concessions: CHF 180 (early bird: CHF 130), with meals: CHF 330 (early bird: CHF 280).

Further details and booking form at:

www.goetheanum.org/Evolving-Science.6941.0.html?&L=1

Organisers: Johannes Kühl, Laura Liska, Matthias Rang and Johannes Wirz.

1st World Mathematics Teachers' Conference

5th–9th October, 2015, at the Goetheanum in Dornach, Switzerland. More details:

www.mas.goetheanum.org/Welt-Mathematiklehrrtagung.7762.0.html?&L=1

Polluted soils remediation

21st–25th October 2015 at Millers Farm, Blakeney, Gloucestershire, UK with Enzo Nastati.

Enzo will share how he has developed biodynamic agriculture to remove heavy metals, salt and agricultural chemicals from soils and water. There's plenty of real-world work to be done. This is our chance to join in with this modern task.

Contact Mark Moodie: [mark \(at\) considera.org](mailto:mark@considera.org); t: 020 7193 4697. Booking online with PayPal:

www.considera.org/enzo2015.html

Seminar: Morphological Thinking

6th–8th November at The Field Centre, Nailsworth, Glos, UK.

An initiative has arisen in the UK to establish collaborative natural science research projects and a series of conferences leading up to the centenary of the founding of the School of Spiritual Science. It is intended that there be a public event or series of events in 2024 to worthily mark the occasion. This has been picked up by Johannes Kühl and Laura Liska, and they are looking to link with those working in other countries so as to stimulate international collaboration as well. Meetings will happen during the Michaelmas 'Evolving Science' conference at the Goetheanum this year (see previous column).

We will begin to develop the initiative at an open meeting on the theme of 'morphological thinking'. There will be contributions from various researchers who have agreed to present in collaborative pairings addressing areas of common interest. There are still opportunities for other individuals or duets to present. Please get in touch with Aksel Hugo at [aksel.hugo \(at\) thefieldcentre.org.uk](mailto:aksel.hugo@thefieldcentre.org.uk) or Simon Charter at [simon.charter \(at\) live.co.uk](mailto:simon.charter@live.co.uk), 01453 836060, mob 07814 786682 if you wish to contribute or attend. There will be a full programme sent out soon.

Projective Geometry, Brighton

A small group meets in Brighton on Mondays at 7.15pm during term-time to explore, through drawing, the laws of

space created by physical and living forces. For details contact Paul Courtney on 07903 961390 or write to PaulR.Courtney (at) live.com

Projective geometry workshop for teachers

16th–19th February 2016 at The Field Centre, Nailsworth, Glos.

This follows a request to give teachers some basic understanding and exercises to use with upper school pupils. However it will be an opportunity for anyone wishing to get a sense of the possibilities that the geometry gives for developing our powers of imagination. More details to follow shortly. If you wish to be informed and have not been to recent geometry meetings please let Simon Charter know. For contact details please see next item.

Projective geometry seminar – Learning to live in space and Counterspace

February 19th–21st at The Field Centre, Nailsworth, Glos.

Following on from the heartening seminar last spring, we wish to continue to cultivate the understanding of simultaneously being in both these spaces. We will sorely miss the presence of Nick Thomas and John Blackwood, this may mean we will not have as rich a feast of content, but their passing has engendered the will to strengthen our work in this field and we trust the meeting will help this aim. Further details will be sent out in due course.

Contact: Simon Charter at [simon.charter \(at\) live.co.uk](mailto:simon.charter@live.co.uk), 01453 836060, mob 07814 786682

Publications

In Context, The Newsletter of the Nature Institute

No. 33 Spring 2015: An open secret – The calyx of *Ipomoea purpurea*, Reinout Amons. Evolution: A third way? Stephen Talbott. Do frogs come from tadpoles? Craig Holdrege.

Editor: Steve Talbott. Single copies of *In Context* are available free of charge while the supply lasts. Contact details: The Nature Institute, 20 May Hill Road, Ghent, NY 12075. Tel: +1 518 672-0116. Fax: +1 518 672 4270. Email: [info \(at\) natureinstitute.org](mailto:info@natureinstitute.org). Web: <http://natureinstitute.org>. The Nature Institute's online *NetFuture* newsletter is available at <http://netfuture.org>.

Recent online articles of the Nature institute

In a culture filled with screens, how can we help children participate in commanding realities so their ideas can be rooted in the world and not in the fantasies of the cyber world? Craig Holdrege's short new article, *Reality-Based Education in a Hyperreal Culture*, explores this critical educational issue. www.natureinstitute.org/txt/ch/techno-utopia.htm

Where Do Intelligence and Wisdom Reside? In study after study, research reveals a profound wisdom in all forms of life, all the way down to the level of cells and molecules. Does that wisdom need explaining, or is it what explains? Steve Talbott addresses this fundamental question in this latest addition to The Nature Institute's Biology Worthy of Life project. www.natureinstitute.org/txt/st/org/comm/ar/2015/bodily-wisdom3_28.htm

In his new article, *Manipulating the Genome of Human Embryos: Some Unforeseen Effects*, Craig Holdrege looks at the recent, controversial experiments in China to 'edit' the genome of human embryos, pointing to both the unintended consequences and profound ethical issues. www.natureinstitute.org/txt/ch/human_gmo_embryo.php

Elemente der Naturwissenschaft

No. 102, 2015: Laboratory intercomparison for biocrystallisation (crystallisation with additives) applied to different wheat varieties, Johannes Kahl, Jens-Otto Andersen, Miriam Athmann, Nicolaas Busscher, Paul Doesburg, Jürgen Fritz, Uwe Geier, Gaby Mergardt. Lebewesen oder modulare Systeme – 'Das Prinzip Leben' als Blickrichtung auf Konzepte der Synthetischen Biologies, Ruth Richter. Bewusstseinstufen und Naturreiche: Versuche zur Naturphilosophie Teil II: Ursachenlehre und stufen der Natur, Renatus Ziegler. Genotyp und Phänotyp – Ursachen im Perspektivenwechsel Von der Stärke instabiler Systeme.

Editorial board: Johannes Wirz (editor-in-chief), Ruth Richter, Johannes Kühl, Mara Born.

Subscription enquiries to: Wochenschrift 'Das Goetheanum', Abo-Service, Postfach, CH-4143 Dornach 1, Switzerland. Email: [abo \(at\) goetheanum.ch](mailto:abo@goetheanum.ch). Fax: +41 61 706 4465.

Editorial enquiries to: Naturwissenschaftliche Sektion am Goetheanum, Elemente der Naturwissenschaft, Postfach, CH-4143 Dornach 1, Switzerland. Tel. +41 61 706 4210. Fax +41 61 706 4215. E-mail: [science \(at\) goetheanum.ch](mailto:science@goetheanum.ch).

Cost: Annual subscription (2 issues, including postage): €30.- / CHF 40.-. Single issues: €18.- / CHF 25.- ISSN 0422-9630.

A list of the contents of back issues is available at <http://www.sciencegroup.org.uk/eleminde.htm>.

Mathematisch-Physikalisch Korrespondenz

No. 260, Spring 2015: Geometry, kinematics and rigid body mechanics in Cayley-Klein geometries (Chapters 9 & 10), Charles Gunn.

No. 261, Summer 2015: Die Wärme als intensive Bewegung, Peter Gschwind.

Edited by Prof. Dr. Peter Gschwind, Mathematisch-Physikalisches Institut, Benedikt Hugeweg 18, CH-4143 Dornach, Switzerland. Tel: +41 61 701 5968. Email: [p.p.gschwind \(at\) intergga.ch](mailto:p.p.gschwind@intergga.ch). Subscriptions are SFr 50/€30 per year.

Jupiter – Astronomy, Mathematics and Anthroposophy

Volume 7(3), December 2012: Punkt und Zahl. Das Imaginäre in Mathematik und Wirklichkeit, Lou de Boer. Mathematik und Geisteswissenschaft – einige Aspekte, Mario M. Matthijsen. Der Maya-Kalender und das Kali Yuga, Gerhard Hermans. Der Siebenstern, Henk van Landeghem. Erneueres Rosenkruzertum im Jahre 1979 nach des I=CH Geburt, Christine Cologna.

Volume 8(1), June 2013: Die Verbrüderung zwischen Mathematik und Kunst – Paul Schatz und Elisabeth Vreede, Matthias Mochner. The old man looked to the stars, Mary Adams.

Editor-in-Chief: Oliver Conrath, Section for Mathematics and Astronomy, Goetheanum, Postfach. CH-4143 Dornach/Switzerland. Tel: +41 (0)61 706 4220, Fax: +41 (0)61 706 4223, Email: [mas \(at\) goetheanum.org](mailto:mas@goetheanum.org).

Publisher: Verlag am Goetheanum, Postfach 131, CH-4143 Dornach, Switzerland. Subscription: Annual subscription € 40.- / CHF 50.- ISSN 1661-8750.

Wasserzeichen

Nr. 41 (2015): Gefährdung unserer Trinkwasser-Versorgung durch internationale Freihandelsabkommen (TTIP, TISA, CETA und weitere), Michael Jacobi. Lässt sich eine UV-Einwirkung auf Wasser wieder entfernen? Manfred Schleyer, Christine Sutter. Unsere Planetenkarte in neuen Erscheinungsbild – eine Forschungsfrage, Manfred Schleyer, Christine Sutter. Über die Quellen, Christine Sutter. Ein kleines Aufmerksamkeitsexperiment – Ergebnisse, Christine Sutter.

Strömungsexperimente für das Erfahrungsfeld in Nürnberg, *Felix Heidiger, Michael Jacobi*.

This issue contains a 23-page tribute to Wolfram Schwenk who died on 1 November 2014.

Plus other items on the Institute, its research, plans, conferences and financing.

Price €3.00 per issue. Free to sponsors.

Editors, Georg Nitsche & Andreas Wilkens, Institut für Strömungswissenschaften, Stutzhofweg 11, D-79737 Herrischried, Germany, Tel: +49 (0)77 64 9333 0, Fax +49 (0)77 64 9333 22. Email: sekretariat (at) stroemungsinstitut.de. Internet: www.stroemungsinstitut.de.

Jahrbuch für Goetheanismus

English summaries for the articles in this publication from 2005 onwards are downloadable in PDF format at <http://www.tycho-brahe-verlag.de>; click 'Inhalte'; select year and click the link near the bottom of the page.

2013: Gicht und Rheumatismus aus psychosomatisch-anthroposophischer Perspektive, *Heinrich Brettschneider*. Blut und Nerv am tierischen und menschlichen Auge – Zum neueren Kenntnisstand eines zentralen anthropologischen Themas in der anthroposophischen Menschenkunde, *Thomas Marti*. Skelettbildung und Darmfunktion der Meeresfische, *Roselies Gehlig*. Von der Symbiose zum sogenannten Brutparasitismus Teil 1: Aus dem Leben der Kuckucke, *Walther Streffer*. Verstehen wir das Leben in Entwicklung? *Wolfgang Schad*. Der Kampfbaum und die Lauraceen, *Michael Kalisch*.

2014: Die Metamorphosen der Pflanzen (Stockholm 1755). Mit einem Vorwort und Nachwort von Wolfgang Schad, *Nicolaus E. Dahlberg*. Zu den europäischen Arten der Ranunculaceen-Gattung *Clematis* L., Waldrebe, *Thomas Göbel*. Von der Symbiose zum sogenannten Brutparasitismus. Teil II: Die Beziehungen der Weibervögel und Prachtfinken zu den brutparasitierenden Witwenvögeln, *Walther Streffer*. Die evolutionäre Bedeutung des Spiels, *Bernd Rosslensbroich*. Die Sinnlichkeit des Menschen. Der Leib als Instrument der freien Weltzuwendung des Selbst, *Heinrich Brettschneider*. Zur anthroposophischen Jugendpsychiatrie: Warum manche Jugendliche sich selbst verletzen und andere gewalttätig werden, *Heinrich Brettschneider*.

Editors: Heinrich Brettschneider, Rolf Dorka, Roselies Gehlig (Editor-in-chief), Angelike Heinze, Hans-Joachim Strüh. Published by Tycho Brahe-Verlag GdB, Am Eichhof 30, 75223 Niefern-Öschelbronn, Germany. ISSN 1866-4830. Tel: +49-(0)7233-68 416. Email: info (at) tycho-brahe-verlag.de. Contents of back issues to 1984: <http://www.tycho-brahe-verlag.de>. Hard cover. €24.50.

Membership

The Group has 42 subscribers. The membership subscription is £5 (UK), £6 (Europe) or £7 (elsewhere).

Members who do not subscribe by direct payments from their bank receive one reminder of a due subscription.

Next Issue

This newsletter is issued to members in March and September each year. Copy for the next issue should reach the editor at the address below by 20th February 2016.

Dr David J. Heaf, Hafan, Cae Llwyd, Llanystumdwy, Cricieth, Gwynedd, LL52 0SG, UK. Tel/Fax: +44 (0)1766 523181. Email: david (at) dheaf.plus.com

Science Group web site: <http://www.sciencegroup.org.uk>