

Science Group of the Anthroposophical Society in Great Britain

Newsletter – March 2015

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News

Projective Geometry Conference report

The second of a series of annual conferences on projective geometry took place at the Field Centre, Gloucestershire, UK on the 16th to 18th February. We certainly felt the impulse has grown this year: many colleagues returned after last year and we welcomed new colleagues as well.

The lectures and workshops were diverse and I hope we shall have a fuller report in subsequent Newsletters. Artistic and imaginative approaches to form and geometrical spaces were included alongside reports of scientific and mathematical work arising out of projective geometry. Nick Thomas gave two very impressive surveys of many aspects of his work building from the fundamental theorem up to and beyond chaos theory. Oliver Conratt, the leader of the Mathematical-Astronomical Section at the Goetheanum in Dornach gave a public lecture on comets, as well as sharing some of his work in physics and mathematics.

A third conference is keenly expected next year. One important dimension of the gathering has been the perceived need for introductory and educational work in this field, so workshops of direct value to teachers will be a part of the next conference.

Alex Murrell alexandermurrell(at)hotmail.com

Mirror Neurons

Friedwart Husemann, Munich

Translated from the German by Daniel Hafner.

In *Riddles of the Soul*,¹ Rudolf Steiner wrote that it is nonsense to distinguish sensory and motor nerves. Both are 'of like nature'. He also maintained that the concept of motor nerves was socially disastrous. Anthroposophical researchers have given thought to these theses.² The well-known correspondence between Karl Ballmer and Gerhard Kienle was reprinted in 2013 and recognized in an extensive book by Peter Wyssling.³

In 1996, the Italian neurophysiologist Rizzolatti discovered the mirror neurons, as he called them, whose existence and function scientists were quick to acknowledge. Rizzolatti, experimenting on animals, noted to his great surprise that some nerves showed stimulation not only when an ape carried out a particular act (such as reaching for food), but also when the ape merely observed someone (the experimenter) engaging in a similar act. Hence the name mirror neurons (*neuroni specchio*).⁴ In other words, mirror neurons always react the same way, whether the ape does something itself or merely observes others doing it. Accordingly, Rizzolatti called the distinction between motor and sensory nerves 'abstract', 'largely artificial'.

The distinction between motor and sensory nerves arose in the middle of the 19th Century on the basis of an experiment with frog legs, which demonstrated a centrifugal electric cur-

rent, running from the brain to the muscle through nerves that were consequently named 'motor nerves'. Stimulating these nerves caused the muscle to twitch. Conversely, a centripetal current from the peripheral organs (sense organs) to the center was noted; the nerves involved were consequently named 'sensory nerves'.

Against this, Steiner, despite the centrifugal electric current, of which he was aware, asserted that the so called 'motor' nerves were in reality just as sensory as the 'sensory' nerves.

The social side of the problem, already noted by Steiner, is treated impressively by Rizzolatti. He says, 'We see with our hands'. That is an outright spiritual concept! According to Rizzolatti, our motor system (to use the old name—today its function is considered at least half sensory) serves to imitate the movements and gestures of other people; it even instinctively recognizes the intentions of other people's movements. The motor system is a communicative system, and thereby the foundation of language. Mirror neurons ensure that our surroundings fit us, that we 'live in an inhabitable world', in which we can find our way. We live with our fellow men in 'a shared space of action'. [In German] his summarizing book, from which we are quoting here, therefore bears the title *Empathie und Spiegelneuronen*, that is, *Empathy and Mirror Neurons* (see note 3). When has such a positive moral concept ever appeared in connection with the electrophysiology of the nerves? Transposed back into the 19th Century, this title would have to read, *Motor Nerve and Egotism*. That was the physiology that has made its mark on us ever since the experiments with the frog legs. Now we are allowed to free ourselves from it.

Mirror neurons are a confirmation of Rudolf Steiner's research, or as he calls it in *Riddles of the Soul*, 'a justification of Anthroposophy'. Rudolf Steiner had to provide the science of his day with this correction, along with the other one, 'The heart is not a pump', mentioned in the previous issue of *Ein Nachrichtenblatt*⁵ [in a review of the new book by Branko Furst, *The Heart and Circulation*—translator], among others, which even for faithful Anthroposophists were often hard to understand. A century later, they turn out to be the cutting edge of established scientific research. A beautiful proof of how exact Rudolf Steiner's research method was. But also a reminder of how patient we ought to be when reading Rudolf Steiner, before claiming that he 'made a mistake', or hastily deforming or distorting his presentations by saying he meant it 'like this', or at any rate 'very differently', and so on.

Notes

1. GA 21, Mercury Press 1996, Tr. W. Lindeman.
2. Wolfgang Schad (editor), *Die menschliche Nervenorganisation und die soziale Frage*, 2 volumes Stuttgart: Verlag Freies Geistesleben, 1992).
3. Karl Ballmer, *Briefwechsel über die motorischen Nerven*, edited by Peter Wyssling (Edition LGC, 2013, ISBN 978-3-930964-22-2); and Peter Wyssling, *Rudolf Steiners Kampf gegen die motorischen Nerven – das Schicksal einer Weltanschauungsentscheidung in Karl Ballmer und Gerhard Kienle* (Edition LGC, 2013). Wyssling does not deal with mirror neurons.
4. Giacomo Rizzolatti and Corrado Sinigaglia, *Empathie und Spiegelneurone* (Frankfurt: Edition Unsel, Suhrkamp-Verlag, 2008). [Translator's note: the subtitle of the German translation is *Die biologische Basis des Mitgeföhls*, that is, *The Biological Foundation for Compassion*; the original title is *So quel che fai*, that is, *I Know What You Are Doing*; the title of the English trans-

lation is *Mirrors in the Brain: How Our Minds Share Actions and Emotions.*]

5. Contact: initiative.e.a(at)gmail.com

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Assessment of Shape Changes of Mistletoe Berries: A New Software Approach to Automate the Parameterization of Path Curve Shaped Contours – Derbidge R, Feiten L, Conradt O, Heusser P, Baumgartner S (2013)

Abstract Photographs of mistletoe (*Viscum album* L.) berries taken by a permanently fixed camera during their development in autumn were subjected to an outline shape analysis by fitting path curves using a mathematical algorithm from projective geometry. During growth and maturation processes the shape of mistletoe berries can be described by a set of such path curves, making it possible to extract changes of shape using one parameter called Lambda. Lambda describes the outline shape of a path curve. Here we present methods and software to capture and measure these changes of form over time. The present paper describes the software used to automate a number of tasks including contour recognition, optimization of fitting the contour via hill-climbing, derivation of the path curves, computation of Lambda and blinding the pictures for the operator. The validity of the program is demonstrated by results from three independent measurements showing circadian rhythm in mistletoe berries. The program is available as open source and will be applied in a project to analyze the chronobiology of shape in mistletoe berries and the buds of their host trees.

Citation Derbidge R, Feiten L, Conradt O, Heusser P, Baumgartner S (2013) Assessment of Shape Changes of Mistletoe Berries: A New Software Approach to Automate the Parameterization of Path Curve Shaped Contours.

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Article

Metamorphosis and evolution: a hundred years of the Glashaus¹ by Johannes Kühl

The building and its mission

The Glashaus is without doubt one of the most beautiful and most loved buildings on the Goetheanum grounds – above all because it reminds us immediately of the first Goetheanum building. Its lavishly beautiful yet simple design is very human.

Its existence we owe to a fortunate event: in the autumn of 1913, i.e. shortly after the laying of the Goetheanum foundation stone, the building office wanted first of all to put up a simple workshop for grinding the glass windows. As someone had the idea of showing the plans to Rudolf Steiner, he outlined the building that we know today! (Source: personal communication from Kurt Remund)

Later, in a lecture (4 January 1915, GA275), Rudolf Steiner described how all the buildings near the Goetheanum should be a metamorphosis of the same thing according to their functions – with explicit relation to Goethe's theory of metamorphosis. The central motif is the double cupola:

'In this interpenetration of the motif of both the cupolas lies infinite variation, lies an infinitude. Only by our having brought about this interpenetration of the motif of the double cupola will we achieve, for the far-reaching artistic phase of

our construction, what expresses itself in our building as a reflection of our spiritual scientific thoughts. Thus this interpenetration is present even in the main building. And even if we once again remove the interpenetration, pull the cupola motif apart, we are then nearing an Ahrimanic principle. Were we to bring them still closer together, or push them into one another completely, we would be building as if we were putting one inside the other. In this way we would arrive at the Luciferic principle.'



And a little before that:

'The basic idea of the double cupola has to be adhered to in all that is in intimate, organic connection with our building...'

This idea is developed with the example of the boiler house. Here the Ahrimanic principle is removed from the building, probably because it was its 'technical centre'. Therefore, it is as if the two interpenetrating cupolas of the Goetheanum were pulled apart, the north side becoming asymmetrically large in comparison with the somewhat stunted south side, and out of this, so to speak, grows the chimney.

Unfortunately we know of no similar description of the metamorphosis that led to the shape of the Glashaus. But we could look for it ourselves. As in the case of the boiler house, here also the two cupolas are pulled apart and separate, thus approaching the Ahrimanic principle, but the building largely retains its symmetry. Is that an indication of the almost violent, though equally artistic activity with which the images were wrested from the hard glass? Or an anticipation of later scientific activity, which always involves an engagement with Ahrimanic tendencies?

According to the information in the plans archive of the Goetheanum, the plans for the construction of the building were drawn up in January 1914. Christoph Lindenberg's record gives 1 April 1914 as the day that construction work started. The official opening of the building was on 17 June 1914, as little as two and a half months later! When we consider that work at that time was carried out almost without machines – as too with the building of the Goetheanum, the construction wood was delivered by horse and cart – this is an amazingly short time. On early photos we can see that initially the roof was not slated, and the chimney was not yet built.

At the opening of the Glashaus, at that time primarily designated as a studio or artists' workshop, Rudolf Steiner gave a lecture, probably in the so-called middle room of the Glashaus (printed in GA286). There he described an important effect of the Goetheanum building: through the relief form the walls are 'speaking'. Through them, so to speak, the speech of the gods can be heard. (Steiner made an interesting aside on this: one would find nothing in nature with this quality – with one exception, namely the relief of the ground, the shaping of the

¹ From a lecture given on 15 October 2014 in Dornach.

landscape!). The reliefs and sculptures become like the larynx for this speech and their effect makes the human being capable of peace:

'My dear friends, however much people wonder how outer institutions can eliminate from the world offending and criminality, true healing of evil into goodness for the human soul will be through true art sending that spiritual atmosphere into the human soul and the human heart such that these human souls and hearts, if they are sympathetically surrounded by what has come about in architectonic sculpture and other forms, when they are inclined to deceitfulness, will stop lying, and when they tend to disturb the peace, will stop disturbing the peace of their fellows.'

Today, in a time when 50 million people in the world are fleeing cruelty and violence, such words go to the heart! Moreover, there is a surprising preliminary remark:

'Perhaps not quite everything will be achieved with our building – because we really want to set up only the most elementary beginnings.'

If we consider that subsequently not one of the people immediately connected with the Goetheanum could experience this capability of peace, then we can sense how far into the future this ideal is projecting!

Then Steiner moves on to the intended effect of the windows:

'All this relief form is an organ for the speech of the gods... What can we wish for when we try to penetrate our walls?... We can do nothing other there than to show that the human being..., in breaking through the wall is seeking a way to the spirit. And we will look at these windows; in their chiaroscuro, in their coloured chiaroscuro they should show us: 'Thus, O Man, you find the way to the spirit.'

And somewhat later:

'But in the moment when we find ourselves in the transition from 'being able to be calm', from 'sitting calmly' to our own movement, to what we want to do in order to find the way to the gods, in that moment we must have movement, yet inner movement; we must break through the wall. These windows must be there to invite our souls to start moving on the path to those places whence we are spoken to through the forms of the walls.'

It is striking how in this lecture, which was essentially addressed to the 'building workers' of the 'Goetheanum site hut', Steiner speaks to the feelings of the people who worked with him there. Thus I will quote another sentence from the end of the lecture:

'My dear friends, better than through words, we dedicate this place of work – for a workplace it is to be – if in going away again from the door, we concentrate with all the powers of our heart on the love of the world of people and of the spirit that is found through what happens in these rooms, the way to the spirit; to the spirit from which, if human beings find it lovingly, will peace and harmony spread among men on earth.'

This in a certain sense describes the mission of the Glashaus and the work described there.

Building office and publishing house

Of course, the Glashaus was initially used mainly for grinding the glass windows. The ready-made glass sheets came from a company in France. They were then installed in the Glashaus before going in the corresponding windows in the Goetheanum building, and were worked on from the inside. At that time, the two 'cupola towers' had no floors. As photos show, the artists were able to stand on a kind of elevator platform that could be raised or lowered, and grind away the glass with corundum discs which were driven by flexible shafts

from electric motors, and probably constantly cooled with water. The windows of the first Goetheanum were made under the direction of Thaddäus Rychter, and those of the second directed by Assia Tugenjew, who, together with Rudolf Steiner, developed the hatching technique (he describes it himself in GA K12). Only after the Second World War were they installed in the building. The building office was repeatedly also accommodated in the Glashaus. Here plans were drawn up, organisation discussed etc. Initially Thaddäus Rychter lived in the flat over the middle room. Later it was occupied by Assia Tugenjew. The building administration was still working here in the 80s, together with at least part of the Goetheanum finance office. Even members of the Vorstand had to collect their salaries in cash from Herr Estermann and Fräulein Ruschmann. Later the rooms were used by the Goetheanum publishers. Floors had long since been installed in the cupola towers, and for decades the two cupolas were used as store rooms!

Science, agriculture and therapy

Science discussions, some with Rudolf Steiner, started in the Glashaus quite early on, 1920 at the latest. Ehrenfried Pfeiffer and Gunther Wachsmuth are two people who met there and together wanted to establish natural scientific work in Dornach. Thus 1921 saw the founding of the 'Goetheanum Research Laboratory'. Wachsmuth describes how such an event is one of destiny:

'Such impulses and the institutions that result from them came about not through outer causes. They were born out of the concrete life-encounter of particular people, whose destiny, and at the same time their free inner resolve to serve spiritual science, brought them together in a particular sphere of life and work. Thus was born this research laboratory in Dornach out of my life-encounter and friendship with Ehrenfried Pfeiffer... (So) it happened quite naturally that, after a short period of sharing thoughts and intentions, a space was sought where experiments could be carried out. At our request, Rudolf Steiner allowed us to occupy a cellar room in the Glashaus, above which the coloured glass windows were being ground, and we started the founding of the laboratory with the most basic act of creation.' (from Alla Selawry: Ehrenfried Pfeiffer, Dornach 1987)

Pfeiffer, who was also in charge of the stage lighting at the Goetheanum and, in consultation with Steiner, studying the sciences in Basel, was more of a practitioner, for he had the urge to experiment, for instance to find experimental evidence for the etheric. Wachsmuth was more the 'theoretician' who worked on his 'system', so to speak, of etheric formative forces. He later set this out in his book *The etheric formative forces in cosmos, earth and man*. As, during the 1923 Christmas Conference, Wachsmuth was employed in the Vorstand and as Leader of the Science Section, Steiner favourably mentioned this book at the conference and directly referred to it as justification for employing young men who were largely unknown amongst anthroposophists. (Wachsmuth was 30 at that time, and not a trained scientist.)

Pfeiffer, who later worked particularly in the fields of agriculture and nutrition, was the first to take up Steiner's indication to investigate the etheric with the help of crystals. The method of sensitive crystallisation was developed in the Glashaus cellar. It is now used in several places round the world, on the one hand for quality investigations, and on the other hand as a help during diagnosis of cancer. Soon a small team of very enthusiastic colleagues supported the work by helping to carry out the experiments. When Pfeiffer was offered a position in the USA and moved there, these people

continued to work on the crystallisation pictures under various leaders. In the 90s, crystallisation lost its importance as a d-agnostic tool.

Thus, at the beginning of work in the Glashaus, the scientific impulse was already combined with practical agricultural and therapeutic applications.

After the dissolution of 'Kommenden Tag' and the Stuttgart science institute in 1925 – Lili Kolisko's biological institute continued to exist – the engineer Paul Eugen Schiller came to Dornach and directed the 'Physics Department' of the Institute. He probably worked in the Glashaus and occupied himself particularly with the sensitive flame method. With this he showed how a gas flame that was 'spoken to' with various sounds shows forms that rapidly change and therefore have to be visualised with a stroboscope. The 'superstroboscope' that he developed for this was even sold out several times. It is noteworthy that Steiner's indication and Schiller's work both inspired, later in the 60s, the work on flow acoustics, and, together with this, the work on ring vortices as a primal phenomenon of flow at the Max Plank Institute for Flow Research in Göttingen. There, over a period of many years, arose round Prof. Ernst-August Müller an extremely fruitful collaboration of young physicists interested in anthroposophy. The connection with the Science Section was always maintained.

Attempts to demonstrate the effect of the etheric

After the Second World War, Frieda Bessenich and later Ate Koopmans took over the leadership of the crystallisation laboratory. Schiller too continued experimental work. For example he investigated whether different warmth qualities could be demonstrated by letting wheat seeds germinate on a table that was heated by water that was warmed by different sources of heat (fire, electricity). However, no differences were found. In another experimental design, he investigated differences in the warmth qualities of day and night with suspended thin metal spirals kept as isolated as possible from other influences. The hoped for results were not forthcoming here either. A young physicist by name of Georg Maier was involved in these experiments, but after their negative outcome he was dismissed.

This work, together with much of the argumentation in Wachsmuth's books, shows a particular attitude: people were looking for experiments and effects that the science of that time could not explain, in order to 'prove' the influence of the etheric. This could not succeed. Where 'inexplicable' effects were discovered, science of course soon discovered the explanatory circumstances. Nevertheless, it is no doubt important that such experiments were carefully conducted for the reason that a negative result is also a result for science, and future scientists can learn from it. As Jochen Bockemühl once put it:

'Given the conditions at that time, in the first and second generation of anthroposophical work it was not as reasonable to think that, in understanding things, it is not a matter of explaining phenomena by adding thoughts, but of contemplating the connections that are in the thing (phenomenon) itself. These connections are the spiritual element that goes to make up the reality of the object of contemplation. This, through the appropriate training, allows organs to be formed that penetrate into deeper dimensions.' (Biographie Gunther Wachsmuths in: Anthroposophie in 20. Jahrhundert: Ein Kulturimpuls in biographischen Porträts. Hg. Bodo von Plato, Dornach 2003)

The etheric in the activity of thinking

Jochen Bockemühl started working in Dornach in 1953. Half his time was devoted to evaluating crystallisation pictures and the other half to his own projects. The germ of his later work on living things was established with botanical and zoological themes.

In 1963, after Wachsmuth's death, Hermann Poppelbaum took over the Science Section leadership. In 1924, as a young biologist in 1924, he had included in a book Rudolf Steiner's thoughts on evolution. Many other publications followed. Even though many things in these publications have in the meantime of course become outdated, his clear and careful train of thought is nevertheless always a pleasure to read! As he became both a member of the Vorstand and its chairman in 1963, for continuing the work of the Section he was largely dependent on his colleagues in the Glashaus. A first significant step was taken in 1964 when Bockemühl and the physicist Mario Howald-Holler founded the journal *Elemente der Naturwissenschaft*. This organ of the Section for the publication and discussion of the work of anthroposophically orientated scientists is still published to this day (Editors-in-chief: to 1973 Jochen Bockemühl and Mario Howald-Holler, to 1992 Georg Maier, since then Johannes Wirz). In about 1968 the two, together with Anselm Basold and other scientists not based in Dornach, particularly Robert Bünsow, Norbert Pfenning and Ernst-August Müller, all three lecturers at the Göttingen University, founded a Section *collegium*, the first of its kind in Dornach! In 1971, on his 80th birthday, Poppelbaum handed over the Section leadership to Jochen Bockemühl.

A multitude of activities started in the Glashaus in the 70s: in many conversations Bockemühl together with Herbert Koepf, who in 1972 took over the leadership of the Agriculture Department of the Science Section, and other friends in biodynamic agriculture, managed to guide the very varied efforts in this movement into working together. The resulting agriculture conferences grew from year to year.

In the meantime Georg Maier had returned to the Glashaus. The collaboration between him and Bockemühl resulted in a big step in their cognitive approach. They no longer sought the etheric as a force 'out there', comparable with a magnetic field, but observed how it was experienceable in contemplating, in the activity of thinking applied to observing. A first step is marked by Maier's essay *Elemente als Stufen der Naturbetrachtung* (EdN 13, 1970). In 1976, as a result of collaboration in the Sektion *collegium*, appeared the book *Toward a Phenomenology of the Etheric World* containing Bockemühl's article *Elements and Ethers: Modes of Observing the World*. Ideas themselves become interpretative organs with which we encounter the spirit in nature. With this publication a research program was outlined that was to leave its mark on the coming years.

In 1976 the 'Anthroposophical Natural Science Study Year' was founded, which continued to the end of the 90s and during which up to twenty students from around the world studied at the Glashaus. The training was initially for two years, later for only one year. The students followed specific courses and did their own projects, particularly on botanical themes, but also on physics, even to the extent of designing the landscape of the Goetheanum grounds! This intensive teaching activity radiated throughout Europe and beyond to many countries and continents.

A further discovery by Bockemühl should be mentioned here: the contraflow of metamorphoses of the leaves on the stem of a plant from below upwards and during leaf development. The same (four) formative principles are at work but in reverse order! This gives a picture of the two temporal courses that Steiner occasionally mentioned.

Most probably, Maier's greatest contribution to physics was in the field of optics. His book, *An Optics of Visual Experience* (Adonis Press, 2011) has become a standard work in 'phenomena-orientated optics'. Among other things he managed to make the world of diffraction phenomena – originally the do-

main of the wave theory of light – accessible to a Goethean approach. The 'Workshop for Physicists and Physics Teachers', held from the 70s until today, has become an annual meeting with colleagues, amongst them Heinz-Christian Chlendorf and Manfred von Mackensen, and students, enriched almost every year by new experiments and series of experiments. Some of these former students have in the meantime been appointed to university chairs and, in their dissertations, built on Maier's work.

The work on crystallisation pictures also progressed, under the leadership of Haijo Knijpenga from 1972 onwards. In those days up to 5,000 blood crystallisations were done annually, and the income from this was able to finance the research!

The section, the Goetheanum and current events

During these years the Glashaus was a place of intensive, lively scientific and anthroposophical work, though at times apparently detached from the rest of the Goetheanum. At times people spoke of 'those up there'. At the end of the 80s a new development started: Section Leaders such as Michaela Glöckler and Georg Glöckler, Manfred Klett as the successor of Koepf as Leader of the Agriculture Department, and later also Christian Hitsch, worked on overcoming the inner separation of the Sections from the Goetheanum. They felt themselves responsible not just for their Sections but also for the whole. Regular meetings of the resulting *collegium* of the School of Spiritual Science were set up comprising Section Leaders and members of the Vorstand. During this time, in 1996, the leadership of the Science Section was taken over by the physicist and former Waldorf teacher Johannes Kühl. Jochen Bockemühl and Georg Maier continued to work in the Glashaus with him, and a friendly collaboration developed with occasional changes in the team.

An era came to an end in the 90s. As in all other anthroposophical trainings the student numbers declined so that the regular study year had to be abandoned. Requests for blood crystallisation were reduced to 500 a year. Funding it became a problem and after the turn of the century this work had to be completely stopped. At the same time larger research projects connected with issues of the day increased in importance, e.g. genetics, (*Ifgene* conference 1996) and, later, beekeeping. These two topics are matters of concern to the biologist Johannes Wirz who shares responsibility for running the Institute. The work on medicinal plants is continued by Torsten Arncken and Ruth Richter. Soon after the retirement of the physicist Florian Theilmann in 2005, Matthias Rang started his PhD thesis on a theme developed from Goethe's *Theory of Colour*. Another dissertation by Renatus Derbidge on form variations in mistletoe berries is in progress. Apart from current themes (radioactivity, technology, quantum physics), Johannes Kühl worked on the relationship of Goethe's *Theory of Colour* to the atmospheric colours.

Attending to the challenges of our time and maintaining contact with friends within and outside the anthroposophical movement were also matters of concern to Nikolai Fuchs, who took over the Agriculture Department in 2001.

From November 2005 to January 2007 the Glashaus was thoroughly renovated. The cupolas were converted into seminar rooms. To this day the colleagues are grateful for the sensitive execution of the construction work by Susanne Böttige and Martin Zweifel. The greatest compliment was probably from a former student who when entering after the renovation murmured: 'Ah – it is still the Glashaus!' With the renewal of the building, the 'Agriculture Department' became a Section. After Nicolai Fuchs left in 2010 he was relieved by a Section

Leader team: Ueli Hurter and Jean-Michael Florin work partly in the Glashaus, accompanied by Thomas Lüthi in Sweden. Some of the time they continue to work as farmers in Switzerland or in the agricultural association in France, so that a particularly strong relationship to their field of work is maintained. Since then both Sections, one representing a caring-understanding view of the earth, the other a caring-cultural application to the earth, have been working in the same building, sometimes on joint projects.

'My dear friends, better than through words, we dedicate this place of work – for a workplace it is to be – if in going away again from the door, we concentrate with all the powers of our heart on the love of the world of people and of the spirit that is found through what happens in these rooms, the way to the spirit; to the spirit from which, if human beings find it lovingly, will peace and harmony spread among men on earth.' (Rudolf Steiner, 17.6.1914)



Above: The Glashaus after the renovation

Meetings/Conferences

Phenomenology of the heart, lung, liver and kidney

A workshop with *Dr. Judyth Sassoon*

These four major organs express a fourfold harmony, as described by Rudolf Steiner. This study will involve observation and hands on investigations, including dissection. It is open to all who would like to experience a Goethean study of anatomy and is especially suitable for teachers, therapists and doctors.

Saturday March 14th 2015, 10.00 am to 4.00 pm. Cost £10.

Goethe Room, Elmfield Rudolf Steiner School, Love Lane, Stourbridge, DY8 2EA.

Coffee and Tea provided. Please bring your own lunch.

Further information: Tel.01384 394633. Mob. 07811 323658

Email: js7892(at)bristol.ac.uk .

School of Spiritual Science and the AS in GB

Sunday 26 April 2015 at Rudolf Steiner House 11am to 4:30pm.

The Council of the Anthroposophical Society in Great Britain has invited all Sections of the School of Spiritual Science to a meeting which will concern I think the forms of organisation in the School and the support which the Society can give the Sections.

Ian Trousell has expressed an interest in attending for the Science Section and one of Simon charter, Alex Murrell or Judyth Sassoon will also attend. If anyone has contributions to the theme of how the Society could support the Natural Sci-

ence Section, or how we can improve and develop as a Section of the School please contact Alex Murrell:
alexandermurrell(at)hotmail.com.

UK Group of the Natural Science Section

The Science Section for members of the School of Spiritual Science who are taking responsibility for the scientific work normally meets twice a year in autumn and spring.

The next meeting will be held on 5th – 8th November 2015 with the theme 'Morphological Thinking'.

The venue is to be confirmed (probably either in Stourbridge or the Stroud area). Please get in touch if you would like to contribute a presentation or offer a short workshop.

Simon Charter, Old Mill House, St Mary's, Chalford, GL6 8NX. T: 01453 882114 Email: simon.charter(at)live.co.uk

Projective Geometry

A small group meets weekly in Brighton, currently on Mondays, to explore the laws of the space underlying physical and living forces.

Please contact Paul Courtney on 01273 557080 or 07903 961390 or at PaulRC(at)btinternet.com for further details.

Evolving Science – An International Conference

30 September – 4 October 2015

Goetheanum, Dornach, Switzerland

Call for Participation We are currently accepting applications for working groups, research presentations and professional group meetings. Please note the information below concerning the format and the documents that we need, as well as the different registration deadlines for working groups and research presentations.

Working groups on special topics The working groups are intended to allow small groups to go into more detail about specific topics and issues. Themes for these working groups may come from any field of science (and do not have to be directly related to the conference theme). Working groups which introduce current research, develop or discuss working methods, address didactic and educational issues, or deepen specific or interdisciplinary themes are particularly desirable. Format: three 90 minute sessions, held in one language (English or German)

Registration for a working group: Please send us the following information: your name and address; a very short biographical sketch (three to four sentences describing your training, professional work and research interests); a personal photo; a title for the working group you wish to offer; a brief summary or abstract (four to five sentences describing the theme and issues you wish to address in the working group)

You may submit your registration in writing, by email (science(at)goetheanum.ch), or on the conference homepage online (<http://science.goetheanum.org/working-groups.6904.0.html?&L=1>).

Information about the working groups will be published with name, title, abstract and biographical sketch in the program booklet as well as on the conference website.

Deadline for working group registration: April 15, 2015

Research presentations on special topics: The research presentations are intended to allow you to share current research with colleagues through short verbal contributions. Following each presentation there will be an opportunity for brief conversation. Topics for contributions can come from any field of science, Goethean observation of nature, formative forces research, development of research methods, application of research results and science education. Due to limited time and the expected number of presentations, we will group contribu-

tions by subject and hold them in sessions which will take place simultaneously.

Format: 15 minutes (approximately 10 minutes for presentation and 5 minutes for discussion) You may hold your contribution in either German or English (simultaneous translation into the other language will be provided.)

Registration for a research presentation: Please send us the following information: your name and address; a title for your presentation; a short summary or an abstract (four to five sentences describing your contribution)

You may submit your application in writing, by email (science(at)goetheanum.ch), or on the conference homepage online

(<http://science.goetheanum.org/Researchpresentations.6911.0.html?&L=1>). Information on the research presentations will be published with name, title, and abstract in the program booklet as well as on the conference website.

Deadline for research presentation registration: August 1, 2015

Parallel meetings of professional groups, research collegiums and advisory boards: Are you a member of a professional group, a scientific advisory board or a research collegium which meets regularly? Then we invite your group to hold their next meeting in parallel with the Evolving Science 2015 conference. We will provide a room at the Goetheanum or in an ancillary building. You may schedule your group during the time slots for artistic courses and scientific working groups and still participate in the conference (i.e., in all events except for the artistic courses and working groups). If you need more time, you may continue to work during the research presentations or during the day before or the day after the conference. For more information on possible time slots please visit our website:

<http://science.goetheanum.org/specialist-professional-groups.6913.0.html?&L=1>.

Format: three 45-minute and three 90-minute sessions. (If necessary, three 75-minute sessions can be added, or additional time can be scheduled before and after the conference.)

Registration for parallel meeting group: Please send us the following information: your name and address; name of the group; an indication of the size of the group, so that we can offer you a suitable room; An indication of the time slots that you want to reserve for your group.

You may submit your application in writing, by email (science(at)goetheanum.ch), or on the conference homepage online

(<http://science.goetheanum.org/specialist-professionalgroups.6913.0.html?&L=1>). Although organising and announcing your meeting is up to you, we ask that you please register by July 1, 2015 so we can plan the meeting rooms and ensure that a room is available for you.

Deadline for parallel meeting group registration: July 1, 2015.

Courses

At Pishwanton Centre for Goethean Science and Art, East Lothian, Scotland

April 9th–19th 2015 Goethean Science and Art – Plant Week.

July 16th–26th 2015 Goethean Science and Art – Landscape Week

October 15th–25th Goethean Science and Art – Animal Week with Margaret Colquhoun

More details of this and other courses are available at: www.pishwanton.org or from admin(at)pishwanton.com, 01620 810259, Quince Cottage, 4 Baxtersyke, Gifford, East Lothian, Scotland, EH414PL.

At the Nature Institute, NY, USA

Mathematics alive! – The Platonic solids. 10-12 April 2015, with Henrike Holdrege and Marisha Plotnik.
Form and pattern in the Amazon – a river adventure 1-12 June 2015, with Mark Riegner and Craig Holdrege.
21-26 June 2015 Awakening to nature's open secrets – pathways in science and art – A living approach to education. 21-26 June 2015, in collaboration with the Alkion Center.
Miracles of light and colour – Phenomenological studies and water colour painting. 9-14 July 2015, with Henrike Holdrege and Jennifer Thomson.
For details see: <http://www.natureinstitute.org/calendar/>

Publications

In Context, The Newsletter of the Nature Institute

No. 32, Autumn 2014: Main articles: Exploring the exploratorium in San Francisco, *Henrike Holdrege*. Let's loosen up biological thinking, *Stephen L. Talbott*. When engineers take hold of life: synthetic biology, *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@natureinstitute.org. Web: <http://natureinstitute.org>. The Nature Institute's online *NetFuture* newsletter is available at <http://netfuture.org>.

Elemente der Naturwissenschaft

No. 101, 2014: Hafer eine Rolle in Kulturgeschichte, Pharmazie und Medizin, *Beatrix Waldburger, Justus Weiß, Franziska Roemer, Florian Stintzing*. Trees in the mystery of space and time, *Ernst Zürcher*. Bewusstseinstufen und Naturreiche: Versuche zur Naturphilosophie Teil I: Bewegliche Vorstellungen, Ideenrealismus und Formen übersinnlicher Erkenntnis, *Renatus Ziegler*. Bienen verstehen, wesensgemäss imkern, *Johannes Wirz*. Rauschen im Blätterwald der Arten – Zu den Frühmenschenfunden aus Dmanisi, *Susanna Kümmell*. Der Kleesäureprozess bei Rudolf Steiner und die Biologie der Pflanzensäuren, *Klaus Frisch*. Die Zentralperspektive und Descartes' 'Cogito', eine geistige Entsprechung, *Andreas Dollfus*.

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

Subscription enquiries to: Wochenschrift 'Das Goetheanum', Abo-Service, Postfach, CH-4143 Dornach 1, Switzerland. Email: 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@goetheanum.ch.

Cost: Annual subscription (2 issues, including postage): €30.- / CHF 40.-. Single issues: €8.- / CHF 25.- ISSN 0422-9630.

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

Mathematisch-Physikalisch Korrespondenz

No. 258, Autumn 2014: Geometry, kinematics and rigid body mechanics in Cayley-Klein geometries Chapters 3-6, *Charles Gunn*.

No. 259, Winter 2014/2015: Geometry, kinematics and rigid body mechanics in Cayley-Klein geometries Chapters 7 & 8, *Charles Gunn*.

Subscriptions are SFr 50/€30 per year.

Edited by Prof. Dr. Peter Gschwind, Mathematisch-Physicalisches Institut, Benedikt Hugiweg 18, CH-4143 Dornach, Switzerland. Tel: +41 61 701 5968. Email: p.p.gschwind@intergga.ch.

Wasserzeichen

Nr. 40 (2014): Rückblick auf die Sommertagung 'Die Lebenskräfte: Arbeiten und Forschen im Ätherischen', *Maarten Gast, Albrecht Zeller*. Neues vom Hochwasserschutz – Arbeiten mit Sand, Wasser und Wind, *Maarten Gast*. Wasser – das universelle Lebenselement, *Wolfram Schwenk*. Ein kleines Aufmerksamkeitsexperiment, *Christine Sutter*. Die Experimente der Sommertagung, *Michael Jacobi*.

Price €3.00 per issue. Free to sponsors.

Editors, Manfred Schleyer & Erhard Meißner, Institut für Strömungswissenschaften, Stutzhofweg 11, D-79737 Herrschried, Germany, Tel: +49 (0)77 64 9333 0, Fax +49 (0)77 64 9333 22. Email: sekretariat@stroemungsinstitut.de. Internet: www.stroemungsinstitut.de.

Membership

The Group has 41 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.

Treasurer's report

Science Group accounts summary for 2014: Income £298.00 (Subscriptions, £292.73; Other, £5.27). Expenditure £215.97. Balance at 31.12.14: £2,617.55.

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 August 2015.

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