

Science Group of the Anthroposophical Society in Great Britain

Newsletter – March 2005

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News

Biological transmutation website moved

The site on biological transmutation research formerly at www.vgv.ch/holleman/holleman.htm has moved to www.holleman.ch. It is also mirrored at www.scienceinthegreen.co.uk. See David Cuthbertson's contribution *Rethinking Biology* on page 7.

Insects and the ethers: a request for information

I would like to know if anyone has any information regarding the ethers (i.e. the formative forces) acting upon insects, and how that interaction changes throughout the year due to the changing of the seasons. If you don't have such information but know of someone researching into insects and the formative forces, then do let me know. I would also like to know of any information regarding the moon affecting insects too. Please reply to Paul Mills at [pamproductions \(at\) hotmail.com](mailto:pamproductions(at)hotmail.com)

Conference Reports

Science Group Conference

Imaginative Participation in Science

Wynstone's School, Gloucester, 1-2 October 2004

This report was written by Derek Forman, except where indicated with an asterisk.

There was a great deal of lively and intelligent response to all the speakers. There were about thirty delegates. Thanks must be due to Wynstone's school for kindly supplying the venue and to Graham Kennish for all his sterling work in organising the catering and accommodation and, of course, Mrs Kennish for supplying all the delicious meals, which helped to augment the friendly and sociable atmosphere.

Modelling the Ego's Encounter Space, *Michael Dowthwaite*

Using the tree as a 'key referent image' and citing William Shakespeare, A. M. Young, J. W. von Goethe, T. S. Eliot, and Renatus Ziegler, the presenter commented on issues of scientific methodology, observation and cognition. The presentation was illustrated with 15 geometric drawings. The following key citation is taken from Ziegler: 'Thus mathematics can be a point of departure for a science of the spirit as it is active, thereby supplementing traditional spiritual science, which is a

science of products of the spirit which have arisen in the past and stay in existence after the spirit is active'. (Copies of Michael Dowthwaite's résumé of his presentation are available from the editor [address on page 10]. Please send a SAE and £1.00 with your order.)

Derek Forman

Derek based his lecture mainly on Ernst Lehrs' book *Man or Matter*. Lehrs analyzes the modern materialist science view as prompting the onlooker consciousness and quotes Eddington 'ideally, all our knowledge of the universe could have been reached by visual sensation alone – in fact by the simplest form of visual sensation, colourless and non-stereoscopic'.

In other words, in order to obtain understanding of the physical world, man has felt constrained to surrender the use of all his senses except the sense of sight, and to limit even the act of seeing to the use of a single, colour-blind eye!

This is why matter in motion is considered primary and all the qualities brought to us by our other senses, such as colour, tone, warmth, density and even electricity and magnetism, are reduced to mere movement-changes.

As a result, modern science is prevented from conceiving any valid idea of 'force'.

Derek quoted from *Matter or Mind* by Davy, Edelglass, Maier & Gebert:

Modern man tends to equate what is real with what is objective and what is objective with what is measurable.

Ignored in all this is the role of the human being in gaining objective knowledge. The human senses are taken merely as receptors of stimuli.

The onlooker consciousness moved in two opposite directions: that of Descartes (1596-1650), 'I think, therefore I am', and that of Robert Hooke (1635-1703), who found by using the microscope that 'things are not always what they seem'. This led to the scepticism of Hume who postulated that 'the mind never perceives any real connexions between distinct existences'.

We were rescued from that particular error by Kant who separated consciousness from matter, but unfortunately only by assuming that the real world is unknowable.

Goethe has shown a way out of this impasse. Our senses as well as our intellect are gifts of nature, and, if at any given moment they cannot solve a riddle of nature, we must ask her to help us. We need to learn to make an *ever fuller* use of the senses and to bring our intellect into line with what they tell.

'The senses do not deceive, but the judgement deceives', is one of his basic utterances. He was sure that:

'the human being is adequately equipped for all true earthly requirements if he trusts his senses, and so develops them as to make them worthy of trust. We need to waken faculties, both perceptual and conceptual, which lie dormant. Every process in nature, rightly observed, wakens in us a new organ of cognition'. Right observation, in this respect, consisted in a form of contemplating nature which he called a 're-creating of an ever-creative nature'.

Modern physicists realise that we can only see objects if their dimensions are at least large compared with the wavelength of light

But eventually we reach sub-atomic levels – distances which are too small to be measured – hence we cannot observe both the position and velocity of a nuclear particle. But physics was always thought of as the science of the measurable!

Since the advent of quantum mechanics and relativity, mechanical explanations are no longer adequate, but most scientists think in the same paradigm as before.

The idea that fire and air were uncreated – 'begotten, not made', if you like – 'In the beginning was the Word [...] in Him was life and that life was the light of men...' continued as an idea into the 15th or 16th century and was part of the philosophy of a great Rosicrucian scientist, Johan Baptist van Helmont (1577-1644).

The modern view of the earth as a mineral body, with living beings superimposed – the implication being that the earth could have continued on its way without man – has now been contradicted by the Gaia concept of Lovelock, after Lehrs' time. Lovelock believes in what he calls 'The Evolutionary or Teleological or Strong Gaia theory' which asserts that 'the atmosphere is kept in homeostasis, not just *by* the biosphere, but *by and for* the biosphere'.

'It is unlikely that chance alone accounts for the fact that temperature, pH and the presence of compounds of nutrient elements have been, for immense periods, just those optimal for surface life. Rather, ... energy is expended by the biota to actively maintain these optima'. (Lovelock and Margulis 1974)

This brings us to the EPR paradox first enunciated by Einstein-Podolsky-Rosen (1935), who proposed a thought experiment that appeared to demonstrate quantum mechanics to be an incomplete theory. The usual view of quantum mechanics says that a wave function determines the probabilities of an actual experimental result and that it is the most complete possible specification of the quantum state. Einstein, Podolsky and Rosen believed the predictions of quantum mechanics to be correct, but only as the result of statistical distributions of other unknown but real properties of the particles.

The physicist, Bohm (1951) presented a paper in which he described a modified form of the EPR thought experiment which he believed to be conceptually equivalent to that suggested by Einstein, Podolsky and Rosen, but which was easier to treat mathematically. Bohm suggested using two atoms with a known total spin of zero, separated in a way that the spin of each atom points in a direction exactly opposite to that of the other. In this situation, the angular momentum of one particle can be measured indirectly by measuring the corresponding vector of the other particle.

He goes on to imply that objective reality does not exist, that despite its apparent solidity the universe is at heart a phantasm, a gigantic and splendidly detailed hologram.

Bohm believed that subatomic particles are able to remain in contact with one another, regardless of the distance separating them, not because they are sending some sort of mysterious signal back and forth, but because their separateness is an illusion. He argues that at some deeper level of reality such particles are not individual entities, but are actually extensions of the same fundamental something.

According to Bohm, the apparent faster-than-light connection between subatomic particles is really telling us that there is a deeper level of reality we are not privy to, a more complex dimension beyond our own. And, he adds, we view objects such as subatomic particles as separate from one another because we are seeing only a portion of their reality. Such particles are not separate 'parts', but facets of a deeper and more underlying unity.

If the apparent separateness of subatomic particles is illusory, it means that at a deeper level of reality all things in the universe are infinitely interconnected.

This may be beginning to sound like spiritual science, but to me it begins to sound more like the eastern view of Maya – not materialist monism, but spiritualistic monism à la Berkeley.

(Copies of Derek Forman's résumé of his presentation are available from the editor [address on page 10]. Please send a SAE and £1.00 with your order.)

Modern science, the modern world and sub-nature,

*Michael Friedjung**

We can approach the subject if we recall that in his last letter to members of the Anthroposophical Society, which a friend of mine considers to be a sort of last will, Rudolf Steiner wrote about sub-nature. Among other things all the technology connected with electricity is one of sub-nature, which can be looked at as being 'below' nature. The subject can also be approached in another way, if we try to overcome the contradictions between what is taught by modern science and many of Rudolf Steiner's statements.

Physics, as practised in the last few centuries, has been based on measurements of distance and of time (with clocks), as well as on counting things. This has become increasingly true of science in general. In following such an approach, science came more and more to study what is very far from human experience in for instance the very small, the very large, high energies, etc. A kind of threshold was crossed by physics about a century ago. We can understand the world studied by modern science, to a large extent, as being one of sub-nature. From this point of view, we may begin to overcome some of the contradictions between modern science and what Rudolf Steiner said. However, I cannot pretend to overcome all contradictions in such a way.

Present day technology is based on the science of sub-nature in, for instance, electronics and nuclear energy. The present world economy is in its turn based on the technology and science of sub-nature. We may note that world-wide financial speculation is now very much supported by the rapid exchange of messages though the internet. We can, from a certain point of view, say that we live in a world which in many ways is one of sub-nature.

The world of sub-nature is not immoral but rather amoral. Knowing it, as well as recognising it for what it is, can help our development.

*Henry Goulden**

The first major work of Rudolf Steiner was to introduce and edit the natural scientific writings of Goethe, starting in 1896.

One of the reasons for undertaking this work was to establish Goethe's approach to nature science, so that when Goethe returns to earth again, his work will be in existence so that he will be able to continue and develop it (see GA172: *Karma of Human Vocation* in connection with the life of Goethe, November 1916).

At about the same time that Rudolf Steiner was working in the Goethe-Schiller Archives, John Worrell Keeley, energised by etheric forces which only he could operate, was constructing his memoirs. This was the first beginnings of the etheric-moral technology of the future (various references by Steiner; see also under Strader Motor, etc).

The source for this presentation was mainly the Beiträge 122 of Rudolf Steiner Verlag, 2000, the so-called 'Schiller file', i.e. notes of the physicist P. E. Schiller who carried out experiments from the founding of the research institute at Stuttgart in 1919 until the 1950s in Dornach, Switzerland.

Schiller's notebooks describe the research carried out by other scientists. For example, following suggestions of Steiner, work was done with gases at low temperatures and high vacuum.

Steiner stated 'You will tend to produce conditions at the sun's centre where matter is annihilated and exists in a nega-

tive state; similarly with space. Spectrum analysis was used in these experiments but for "true" results the spectroscope would need to be modified'.

(It should be noted that conventional physics is now able to produce very high vacuums and low temperatures near absolute zero where liquid helium behaves in a manner defying the laws of matter).

It is now almost taken for granted that a quite new approach is required to understand processes on the Sun: our earth-related physics is not adequate to describe the highly complex 'sun' etc. (see report in *Sky and Telescope*, the authentic journal of astronomy).

Steiner describes electricity as 'evil', i.e. in the sense that it is out of place, no longer to be used, in earthly/human evolution; of course it is a far cry to the etheric-moral technology of the future.

Goulden referred to the important manner of working of Michael Faraday described by Elspeth Crawford in 'Learning From Experience' (see essay in *Faraday Rediscovered*, Macmillan Press, 1989, ISBN 0-333-51122-0).

Faraday's discoveries could not be used until 'mathematised' by the genius of Clark Maxwell which enabled electrical engineers to use Faraday's discoveries for technology (see *The Man Who Changed Everything – the life of Clark Maxwell*, recently published).

Goulden spoke further concerning the indications about electricity by Steiner as reported in the Schiller file, e.g. 'We do not know electricity, except by its effects.' and 'It is in origin an astral force'.

There followed a description of Ernst Lehrs' doctoral thesis on the 'skin effect' in electrical conductors and Steiner comments with a setting up of a task which could result in giving an explanation of the nature of electricity. Sadly, Dr. Lehrs writes in his autobiography (*Gelebte Erwartung*) that he was not able to do this.

The subjects touched on in the Schiller file and Steiner's comments and recommendations for scientific research are too numerous to mention.

Especially noteworthy is what is written about the importance of experiments and the ways they are carried out.

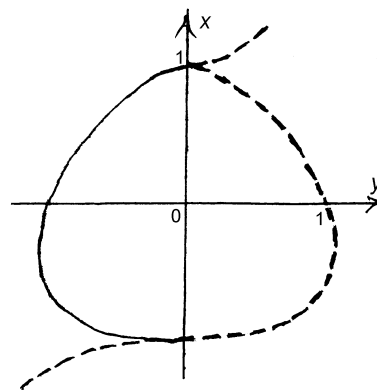
1. The attitude of the scientists: the work-bench should become an altar.

2. The co-operation of elemental beings should be sought – 'you may well be surprised'.

N.B. The Schiller file will be published in English later this year.

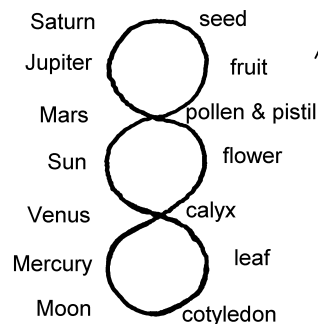
The seven cubic curves and their duals, Ron Jarman*

In Lawrence Edwards' great work on path curves and his exact statistical analysis of the forms of plant buds, the living human heart and its rhythms, etc. he was able to show the correspondence of cosmic processes with living ones here on earth, especially that between planetary conjunctions with the varying profiles of plant buds. Every bud shape has a particular parameter which he denoted by the Greek letter λ . For example this profile comes from $\lambda = 2$ in the general equation of $x^{1+\lambda} = (1+y)(1-y)^\lambda$, i.e. $x^3 = (1+y)(1-y)^2$, and rotating this cubic curve round the x axis. This is the only bud whose path curve is a cubic.



In the following paper we are not concerned with path curves (except for the first example) nor with statistical comparison with plant forms. The set of seven cubic curves on the following pages show a gradual transformation of the general cubic isomorphic qualitatively with the evolution of the whole bud through flower, fruit and seed. In the talk I gave last autumn I showed forms as they emerge from a branch of a tree, but here I show forms which emerge parabolically from the infinite line (which is an inflexional tangent). This enables us to use a simpler general equation $y^2 = x^3 - px^2 + qx$, where p and q are variables in the transformation.

Goethe wrote about the rhythm of expansion and contraction in the evolution of the plant. Since then various researchers, e.g. Fritz Julius, have shown the significance of the seven wandering stars for these seven stages of plant development.



Books usually refer to five species of cubic curves, but there are three essentially different unipartite cubics so the list below shows seven curves.

Cubic Type	Plant Stages	Planet	Values of Variables
1. Cuspidal	sharp spot on branch	Moon	p = 0 q = 0
2. Simple unipartite	rounded shoot	Mercury	p = 2 q = 2
3. Special unipartite	autumnal bud form	Venus	p = 3 q = 3
4. Snaking unipartite	spring bud becoming flower	Sun	p = 3.5 q = 3.5
5. Crunodal	opened flower	Mars	p = 4 q = 4
6. Bipartite	fruit	Jupiter	p = 4 q = 3.75
7. Senodal	seed	Saturn	p = 4 q = 0

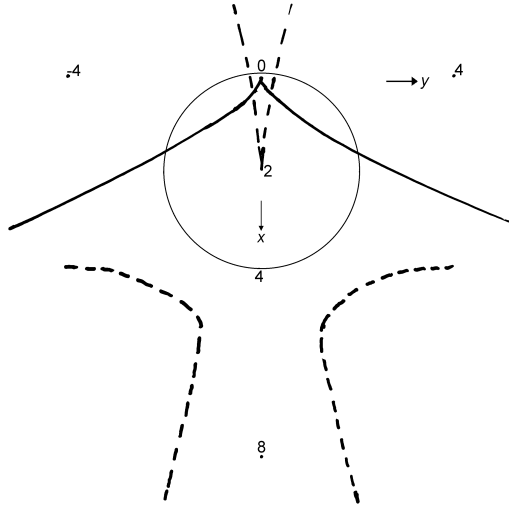
The finite inflexional tangents of the unipartite cases 2 and 4 meet above and below the curves, but case 3 is special as they meet in the vertical infinite – the only case where all three inflexional tangents are concurrent. In autumn the buds pre-

paring for next spring show this clearly in the red-twigged lime tree (*Tilia rubiensis*).

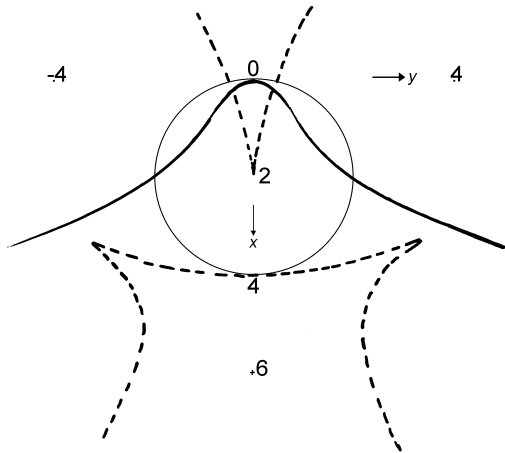
Just as the cubics show the transformation from single to double forms, so do their duals show corresponding changes (see diagrams below).

1. The sharp blade descending from above has a cusp which is the dual of the infinite line which is an inflexional tangent to the cubic in all seven stages.
2. Two further cusps appear forming an anvil or chalice shape below the blade.
3. The three cusps are now collinear.
4. The blade descends into the chalice.
5. The chalice reaches up, its cusps disappear, and its form unites with the blade in parabolic branches.
6. The cusps reappear on the blade whilst the infinite line reaches up and changes into a companion of the chalice in a hyperbola-like form.
7. The acnode on the cubic dualises into the horizontal line which touches the rest of the cubic form.

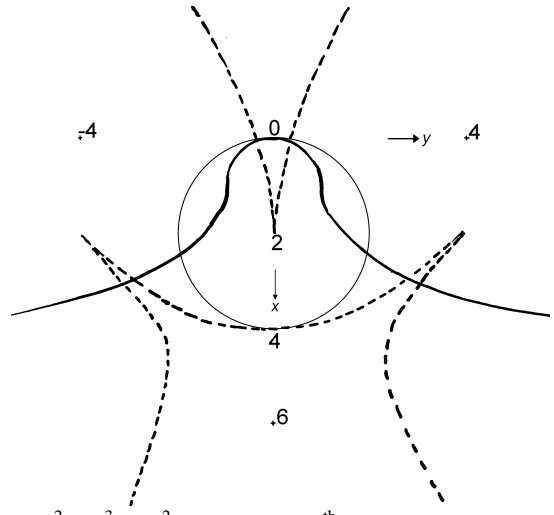
Question: Is all this a picture of what is happening in the plant's etheric body whilst the changes in the cubic form indicate what is happening to the plant's physical form?



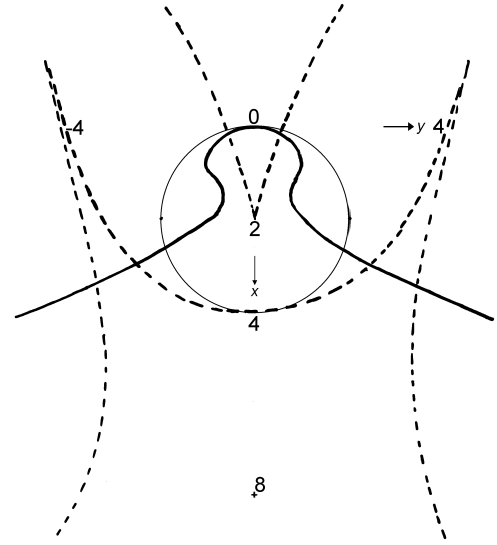
1. Cubic $y^2 = x^3$ and its 3rd class dual.
N.B. The circle $x^2 + y^2 = 4x$ is used to construct the dual, but with the imaginary circle $x^2 + y^2 = 4x - 8$ in mind as conic of reciprocation. In this and the following diagrams the solid line is the cubic and the broken line its dual.



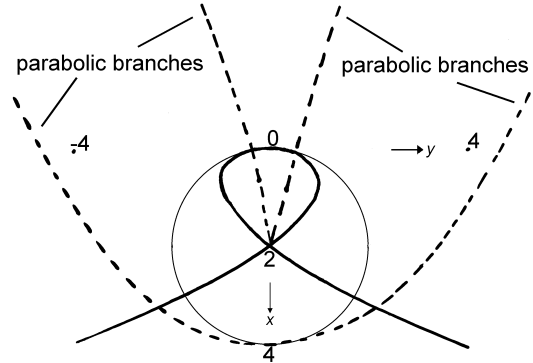
2. Cubic $y^2 = x^3 - 2x^2 + 2x$ and its 6th class dual containing three cusps.



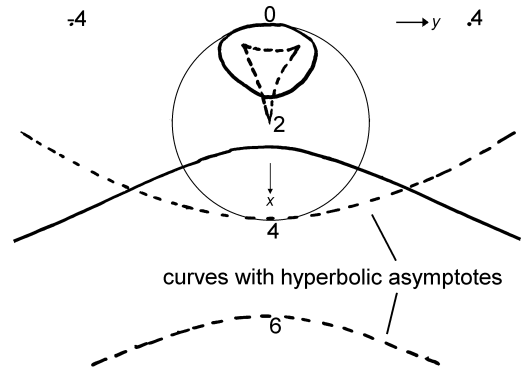
3. Cubic $y^2 = x^3 - 3x^2 + 3x$ and its 6th class dual. A special case with the three tangents of inflexion of the cubic concurrent and the three cusps of the dual form collinear.



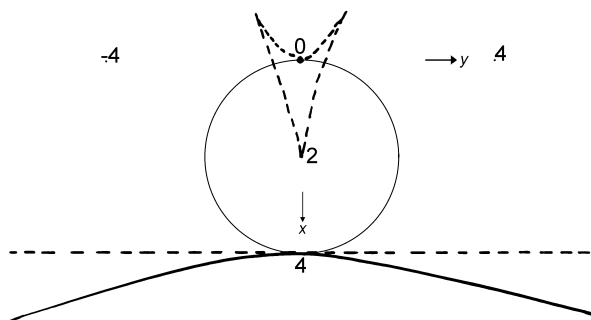
4. Cubic $y^2 = x^3 - 3.5x^2 + 3.5x$ and its 6th class dual (vertical 'blade' has now pierced the chalice).



5. Cubic $y^2 = x^3 - 4x^2 + 4x$ and its 4th class dual (chalice has reached up towards the infinite and continues into the blade).



6. Cubic $y^2 = x^3 - 4x^2 + 3.75x$ and its 6th class dual (the chalice has become a hyperbolic type of curve along with a curve which has risen up from the infinite; also the top of the tricuspidal curve has fallen from the infinite above).



7. Cubic $y^2 = x^3 - 4x^2$, i.e. $y^2 = x^2(x - 4)$, a curve plus the conjugate point 0, and its 4th class dual (the tricuspidal now passes through 0 and the two hyperbolic branches coincide in the line $x = 4$).

The seed(s) and their scattering through the air can reach the warm earth to form new plants.

N.B. The class of curve is equal to the maximum number of tangents that can be drawn from any point to the curve. Thus cubic curves, whilst of the third degree, are of the 3rd, 4th and 6th class. Their duals in consequence are of the 3rd, 4th and 6th degree but are all of the 3rd class.

Nick Thomas

To do justice to Nick's lecture it may be necessary to read both undermentioned books! He defined science as an activity of the human spirit, as stated by Steiner in his 8-lecture series *The Boundaries of Natural Science* (Trans: F. Armine, K. Oberhuber, Dornach 27 September – 3 October 1920, GA322, Anthroposophic Press).

The overpowering influence on our thinking by a purely mechanistic science in the nineteenth and twentieth centuries has created a troubling disparity between the inner experience of human consciousness on the one hand, and the scientific conclusions about the world, and life itself, on the other. These two viewpoints conflict perpetually in our daily consciousness, though most of us may pay little heed to the disparity.

Increasing efforts are expended by governments and their advisors to solve society's problems and to manage society on scientifically sound principles: 'the scientific method ... is powerless to explain the consciousness that directs it,' – and without truly understanding the nature of human consciousness – in its many aspects – and its relationship to the surrounding world, such efforts invariably bring further strife.

Steiner argues for a twofold extension of consciousness. The first involves mental disciplines leading to a pure, sense-free thought activity. The second requires the mind to learn how to set aside thinking and give itself over to pure perception. Both exercises can lead to the development of higher cognitive faculties that enable us to grasp the vital connections between the inner and outer realms.

Materialist science uses the velocity of light as a yardstick, but Nick Thomas argues that light, as such, does not have a velocity (see his book *Space and Counterspace*).

By the end of the 20th century, science had become theory-laden. Thomas Kuhn had defined a 'paradigm' as a way of seeing the world. The 19th century paradigm was materialism, which had become identified with 'mathematicism' after the Copenhagen dialogues.

Rudolf Steiner developed the qualitative path of seven stages leading from Earth through Water, Air, Warmth, Light and

Chemistry to Life. The individual characteristics of each of them (elements and ethers) have to be grasped through meditative (i.e. clear) thinking.

The contrast between centric and peripheral forces is a vital theme in the book. Rudolf Steiner remarked in his *Light Course* that what exists in nature (including inorganic nature) can never be explained by centric forces alone. Save for artificial things made by human beings, cosmic (or peripheral) and centric forces are always flowing together. Steiner declared 'We are not credulous believers in the physics of today, nor need we be of Goethe. In the second (Inspiration) stage the hard won living pictures of the first (Imagination) stage have to be sacrificed and washed away before the new experience sounds through us, when not mental pictures but pure concepts supply the ground above which one builds'.

June Woodger*

This talk was mainly in the form of slides, but began with the following quotations: It is rhythm (time) that brings energy into space, producing form. This is the process of all creativity (E. Graham Howe: *The Mind of the Druid*). The *Oxford English Dictionary* definition of disaster: Dis = asunder, apart from; aster (L) astron (Gk) = the stars; so to experience disaster is to be torn from the stars; i.e. from reality, from spiritual truths.

Before we look at the trees, we need to experience the whole universe: the stars.

As we move more towards the earth, we come to what Lehrs calls 'border phenomena' – with cloud formations, the atmosphere, and so towards the trees.

The periphery of the tree as a meeting place (a border) between the air movement, temperature, moisture outside the canopy and the changes inside it.

Lawrence Edwards' work on buds has proved scientifically that planetary movements are directly connected to trees, (using Steiner's use of certain words in the first Goetheanum) due to their cosmic backgrounds, but do we actually look at the tree as a whole – the tree in time and space?

The work of Stephen Schmidt at Schloss Rittershau showing (for example) more planetary aspects according to plantings of oak under Saturn opposition, not the Mars opposition as is 'normal'.

I could not do justice to her very interesting lecture without actually repeating the slides. There were quite a number of different slides of the various trees, but all I can do here is summarise the planets and relevant trees.

Moon	cherry willow
Saturn	beech hornbeam conifers
Venus	birch apple
Mars	hawthorn oak
Jupiter	sycamore field maple Norway maple
Mercury	elm
Sun	ash

The order of this list is important! Each group are paired opposites, e.g. Moon = nearest to earth; Saturn = most distant visible to naked eye. Similarly Venus and Mars are paired as is well known! Jupiter and Mercury are related to consciousness: Jupiter = higher wisdom, Mercury = 'ordinary' thinking. For

example apple and hawthorn are very good at showing opposites. Both are Rosaceae, so the contrast Mars, Venus is very clear.

Conference: Earthly and Heavenly Harmonies IV Hawkwood College, October 7th – 10th 2004

This biennial conference on scientific and astronomical themes attracted about thirty participants.

Wolfgang Held spoke about Mars, contrasting the usual characterisation of Mars as the planet of war with Rudolf Steiner's as the representative of speech, to be precise the persuasive power of speech. This has nothing to do with politician's 'spinning', rather it means speech with conviction, one could almost say the magical power of speech. More Martian contrasts are to be found in the topography of this planet, in its weather (the colour changes resulting from the periodic dust storms are visible to the naked eye), even when one compares Mars' waterless present with its past when there was water, or so it appears. He also approached, from a scientific perspective, the idea that the moon is a dwelling place for the angels. Its function as a bridge to the cosmos is clear. Not so obvious perhaps is the relationship of this in some ways very dead cosmic body to life. And its separating from the Earth, with the consequent slowing of the latter's rotation on its axis, enabling human consciousness.

Sustenance in equal measure was given by the other speakers: John Meeks related astronomy to mythology. He spoke of how for example in Boticelli's *Mars and Venus*, Mars' sleep can be seen as an initiation with Venus as hierophant. His words connected very effectively with Wolfgang Held's on Mars. Malin Starrett demonstrated the patterns made in fine sand on a taut membrane in response to a sung note: the Eido-
phone.

What steps have been taken in anthroposophical natural science, in initiation physics for example, since Steiner's time? This question was addressed by Henry Goulden who based his presentation on the 'Beiträge' 122 (Rudolf Steiner Verlag 2000): Rudolf Steiner's Proposals for Research Projects in Natural Science, from the founding in 1919 of the Research Institute in Stuttgart.

Desmond Cumberland reported on what has been achieved in efforts to understand lemniscatory planetary motion. (Text available from the lecturer: telephone 01252 656310).

John Salter showed us how he has interpreted in black and white shaded drawings the different qualities of the zodiac constellations.

Thomas Meyer spoke vividly about the life and work of Ehrenfried Pfeiffer, who, scarcely twenty years old, was given the task by Rudolf Steiner of setting up the stage lighting in the first Goetheanum. Seeing the 'Prologue in Heaven' in Goethe's *Faust*, with continuously changing colours at 40,000 watts was an unforgettable experience, he writes in his autobiography. But it was to research, chiefly in biology, ecology and biodynamic agriculture, that Pfeiffer devoted most of his energies in the USA. Born in 1899, Ehrenfried Pfeiffer died in 1961.

A high point of the time we spent together was a performance of string quartets by Dvorak, Prokofiev and Beethoven. These were played by the Astaria String Quartet, founded by the cellist Sean Gilde.
Henry Goulden

Correspondence

The Phenomena of Coloured Shadows

I was grateful to Malin Starrett for his letter in the 2004 issue of the Newsletter with his further comments on my remarks on the phenomena referred to. He is quite right in pointing out that the 'viewing tube' can produce contradictory results. My awareness of this was confirmed when I observed the demonstration Malin gave at a conference in Cornwall a few years ago. Previously I had observed coloured shadows cast by objects with illumination shining through coloured or uncoloured glass, where the light sources were wax candles or low wattage bulbs (40W or less). Malin's light sources were very strong in comparison, so that the green shadow on the opposite side of the opaque object to the red light source was very bright and clear. It may be that such a brilliant and technologically produced light source is the cause of the errors which Malin may have made.

Since that demonstration he made in the Cornwall conference, I showed the experiments I had made in a conference of the Science Section of the School for the Science of the Spirit in Stroud. Those present agreed with my conclusions; also that Rudolf Steiner had confirmed that his own earlier deduction that coloured shadow were 'objective' rather than 'subjective' phenomena was incorrect. As I reported in an earlier comment in our Newsletter, referring to the German 1964 edition of the 'Light Course', Steiner later affirmed that Goethe had been correct in saying that coloured shadows are 'subjective' and added with laughter, 'It is not for me to contradict Goethe's *Farbenlehre!*' What was particularly instructive in the Stroud Science Section Meeting was an observation by Stuart Brown that there was no need to use a viewing tube, for if you had been looking at the dark grey shadow before the red light was brought into play it remained grey and did not become green *provided that*: (1) the red light was not too strong; (2) you did not allow your eye(s) to move its (their) focus whilst the red light came into play or even (much harder to train the will for this) when the red light was subsequently removed. Operation of the red light is best done by someone other than the observer, of course.

Malin asks if I have good reason for utilising the viewing tube in my experiment. The simple answer is that Steiner was called upon to use it and that Malin himself had used it. But I was also of the strong opinion that the truth about coloured shadows could only be gained through using both eyes rather than by using photography or any other modern technological apparatus. A cardboard tube is hardly modern technology, however, but Stuart Brown showed that given sufficient self control even the tube is unnecessary.

I must add that although Malin correctly says that the viewing tube produces a 'contrast effect' in that the eye is surrounded by a dark field when looking at the area of interest and the circular area tends to lighten, it is not true that the colour of this area is 'desaturated'. It has the same hue whether it was at first grey, red, green or any other hue.

As mentioned in my earlier article, Rudolf Steiner's first (incorrect) declaration was that coloured shadows are objective; nonetheless he was adamant that the word 'subjective' must not be equated with the adjective 'unreal'. Mirages in the desert are real phenomena and if the eye is touched by an active electric wire it may see sparks and blinding light, but our senses do not lie. Only our thoughtful deductions often make mistakes by assigning wrong causes to what our senses give us.

Finally, I very much liked Malin's six questions at the end of his letter. They go beyond purely physical phenomena and indeed will only be answerable when we take into account the activities of our etheric and astral bodies and the destiny of our individualities.

Ron Jarman

Rethinking Biology

It was 1988 when I was asked by a friend to repeat the experiments of Louis Kervran. He had observed that chickens fed a calcium free diet still produced normal eggshells when silicon in the form of mica was available. Conventional science states that such chemical element transmutations are impossible. This means that even if such phenomena are genuine they are on the very boundaries of science and will therefore be extremely difficult to prove. I refused the request. Seven years later, the daughter of the recently deceased Professor L.W. J. Holleman asked me if I would be interested in furthering his biological transmutation research. This time I agreed. In Holleman I discovered an analytical chemist with a careful, critical approach towards an understanding of a phenomenon about which I was torn between open-mindedness and scepticism. I agreed to study his work and to publish my findings on the Internet.

Holleman was inspired by the work of two men. Firstly, Rudolf Steiner, whose agriculture lectures Holleman obtained in 1933. In his copy he underlined just one sentence, from the fifth lecture; that biological transmutations of chemical elements may be ascertained even by the purely external standards of quantitative analytical chemistry. The other inspiration was that of the chemist Herzelee who was, in turn, inspired by Goethe, believed that inorganic nature was a product of the organic. However Holleman's faith was not shaken when his own replications of Herzelee's sprouting seeds and roots experiments were unsuccessful. The variability of the results was such that no clear quantitative conclusions could be made.

In the hopes of overcoming the challenge of statistical variability Holleman later chose to use the microscopic single celled green alga *Chlorella*, so that the elemental composition of an extremely large number of individuals, contained within just a few small culture dishes, could be studied over a number of generations. In 1981 Holleman's *Chlorella* experiments produced positive, though unexpected, results. The potassium concentration in the first culture cycles initially decreased, but then increased back to its original level. Detailed considerations of possible errors by both Holleman and myself have proved negative. However, further improvements to his experimental methodology failed to obtain positive results.

Because of my publishing this work on the Internet the Professor L. W. J. Holleman Stichting, a not-for-profit Trust set up to further Holleman's research ideas, was contacted by Professor Jean Paul Biberian of the Marseilles Luminy University. He is a physicist with an interest both in biological transmutations and the related phenomenon of 'cold fusion'. Financial support from the Dutch 'Jonas Stichting' enabled him to conduct preliminary experiments with a marine bacterium.

The results of Biberian's experiments, conducted during 2003/4 were just as unexpected and inexplicable as Holleman's were before him. Taken as a whole they were extremely variable and no general trends could be made out. However one set of results was completely inexplicable. The two parallel, supposedly identical, experimental cultures showed equal but opposite elemental deviations from the original nutrient solution. Because individual chemical elemental deviations were not equal, one dish could not have somehow obtained culture solution from the other. With both Holleman's and

Biberian's results it was as if somehow the fundamental conservation laws of matter and of energy were capable of transcending space or time.

As a step towards understanding such a phenomenon I accepted Biberian's invitation to attend the 11th International Conference on Cold Fusion (ICCF11) in November 2004. Whilst mainstream quantum mechanics states that chemically assisted nuclear reactions are impossible, the evidence presented was sufficient even for sceptics to acknowledge that 'anomalous behaviour' had been observed. Of note was that the outwardly irreproducible nature of the results fell within a consistent pattern; they possessed meaning.

The Ukrainian nuclear physicist Vladimir Vysotskii presented some of his latest biological transmutation research at the conference. His approach was to use his knowledge of conventional nuclear physics to identify a single nuclear reaction that produces an isotope of iron not normally found in nature. Using a number of bacteria species capable of growing in such a hostile environment he was able to observe significant differences between biological cultures and controls. Isotopes are chemical elements with different atomic weights. Some are stable and naturally occurring, though most are radioactively unstable. A change in isotopic composition can only occur by means of a nuclear reaction. Isotopic analysis is essential for understanding the physical aspects of such phenomena. Professor Biberian proposes that with €150,000 for isotopic analysis equipment and a further €50,000 per year over four years he could make serious steps towards an understanding of this extremely challenging phenomenon.

At the suggestion of Jennifer Greene, an expert in the life giving properties of water, I have been searching for a scientific paradigm within which such phenomena may be understood. My initial attempt at enabling an understanding of Nick Thomas's linked space-counterspace work was presented as a poster display at the ICCF11 conference. The paradigm was, however, too far away from that which most – even open-minded – scientists are willing to consider. If it were not for the long, slow, challenging journey that I have made via Goethean plant observation I too would be extremely sceptical. For a non-Anthroposophist, especially for a conventionally trained scientist, a paradigm of reality involving a second 'etheric' aspect is something that is totally alien. Nevertheless, Thomas' work appears to be the most promising framework within which phenomena at the boundaries of natural science may be understood.

Unfortunately both evidence and theory are a long way from being acceptable to a sceptical mainstream science. Nevertheless, with financial and technical support, especially from groups and individuals with particular expertise in mathematics, physics, chemistry, biology and Goethean Science, I believe that progress can be made.

For further information I can recommend:

- Baumgartner, S., Hauschkas Wägersuche: Gewichtsvariationen Keimender Pflanzen im geschlossenen System, *Mathematisch-Astronomische Blätter*, Neuer Folge, Band 16 (Dornach: Philosophisch-Anthroposophischer Verlag am Goetheanum, 1992).
- Bortoft, H., *The Wholeness of Nature: Goethe's Way of Science*, (Edinburgh: Floris Books, 1996).
- <http://www.anth.org.uk/NCT/> (Nick Thomas's projective geometry website).
- <http://www.holleman.ch> (The Professor Holleman Trust website).
- <http://www.lancs.ac.uk/depts/philosophy/awaymave/405/block4.htm> (Isis Brook's phenomenology website).

- <http://www.scienceinthegreen.co.uk> (My website).
- Thomas, N., *Science Between Space and Counterspace: Exploring the Significance of Negative Space*, (London: New Science Books, 1999).
- Vysotskii, V.I., *Nuclear Fusion and Transmutation of Isotopes in Biological Systems*, (Mocâa: Mèp, 2003) – in English and Russian.

David Cuthbertson, 50 Balsdean Road, Brighton, Sussex, BN2 6PF, Tel. 01387 307681,

Email: scienceinthegreen (at) yahoo.co.uk

Meetings

UK Group of the Science Section

There will a meeting of the UK group of the Science Section on Saturday 29th October 2005 at Elmfield School, Stourbridge for members of the School of Spiritual Science who are taking responsibility for the scientific work.

For further details, and requests to be added to the Science Section mailing list, please contact Simon Charter, Juniper Cottage, Ludlow Green, Ruscombe, Stroud, Glos GL6 6DQ. Tel: 01453 755614. Email: Simon (at) ebbandflow.fsife.co.uk.

Internet and the Path of Higher Knowledge A Workshop-Conference, Scotland, 10-16 November 2005 Organised by Anthro-Tech Research Institute

The Internet would offer you access to all human knowledge about physical and spiritual existence. It would let you sell your own ideas to the whole world. Is this not the boon for which we have been waiting, the ultimate knowledge-instrument, which will enable every one of us to spread our wings of soul and soar aloft? Gift of the gods or pernicious illusion – one thing is certain: the Internet will sweep away our former ways of life forever.

It is a strange paradox indeed: the Internet is meant to bring all human knowledge within our reach, yet the working of the World Wide Web itself lies beyond our knowing and control. No engineer can visualize the design of its physical components; no human mind can compass the intricacies of its software.

In essence the World Wide Web is a gigantic matrix of thoughts in the electrical state – a shadowy world-intellect of unimaginable power. It is conscious but uncaring, insensitive and immoral, devoid of feelings and without reverence for any being higher than itself. It is not a neutral instrument that leaves us free. Its influence on the subconscious mind is very great. Those who unite themselves too closely with the Web will not escape its meshes, even in death.

The aim of our workshop-conference is to bring up into our full consciousness this deeper nature – both physical and spiritual – of the Internet. This esoteric study will include some practical work in digital electronics (no prior knowledge or skills are necessary). We shall examine what it means to develop one's own inner faculties of knowledge, or to rely upon a vast outer web of electricity. And we shall see why these two ways of working cannot be compatible.

Cost: £225.00.

Contact: Philippe Rigal, Anthro-Tech Association, Tobermory, Isle of Mull, PA75 6PH. Fax: 01688 302 532 or 01688 302 464; Tel: 01688/ 302 532

Courses

New faculties for dealing with an ever changing world

Science Section, Goetheanum, Dornach, Switzerland, March 29 to June 25, 2005

The challenge: The current natural, technological, medical, economic and social sciences exhibit an unprecedented power to shape and transform our world.

The fundamental methodological tool to do this requires a stringent process of reduction and fragmentation. Besides the apparent success of this tool, its detrimental implications for both man and nature suggest that it modifies the objects of research themselves.

The offer: For the creation of a new world that accords with the fundamental needs of both man and nature, holistic views, i.e. new ways of sense perception and thinking, are essential. Unbiased perceiving and thinking mean becoming aware of both the intentionality in our experience and the recontextualisation of our ideas. A thirteen-week course will tackle this task in the following way:

- Developing a thorough understanding of the fundamental process of perceiving and thinking.
- Exploring how percept and concept relate in different scientific disciplines.
- Developing an approach to unravelling the percept-concept relationship in the humanities.

The programme:

- Study of selected texts by Johann Wolfgang von Goethe, Rudolf Steiner and Owen Barfield
- Four three-week courses in phenomenology, Goethean science and the humanities
- Artistic activities throughout the term for experience and observation of creative processes
- Exercises for developing personal meditational practice
- An individual research project
- A one-week excursion to an alpine valley with a long and exciting history of human culture

The costs: The fee for the term is CHF 1,500.- (excursion excluded); a further amount of about CHF 800.- per month will be required to cover accommodation and meals.

Principal tutors: Johannes Köhl and Johannes Wirz

The further information and registration: Science Section Goetheanum Research Institute, PO Box, CH-4143 Dornach 1, Switzerland Tel: +41 61 706 42 10. Fax: +41 61 706 42 15 Email: science (at) goetheanum.ch

Web: www.forschungsinstitut.ch

Schumacher College, 17-22 April, 2005

Patterns and Mysteries: New ways of learning from nature. Tutors: Janine Benyus and Rupert Sheldrake. New methods of scientific inquiry, new ways of watching and learning, can transform the way we view nature. The scientists teaching this course will help participants experience this for themselves. Janine Benyus is a life sciences writer and author of six books, including her latest – *Biomimicry: Innovation Inspired By Nature*. Rupert Sheldrake is a biologist and author of 9 books, including *A New Science of Life* and *The Rebirth of Nature*. For further information contact the Administrator, Schumacher College, The Old Postern, Dartington, Totnes, Devon TQ9 6EA, UK

Tel: +44 (0)1803 865934; Fax: +44 (0)1803 866899.

Email: admin (at) schumachercollege.org.uk

Web: <http://www.schumachercollege.org.uk>

Review

Baron Harvest, by Peter Lind

JD Publishing, Kezier, Oregon, 2004, ISBN 0-9760617-0-8

The author is a doctor of chiropractic in Oregon, USA. His interest in health issues led him to investigate genetic engineering, the 'tip of a tremendously dangerous iceberg'.

Imagine combining a polemic like Moyra Bremner's *Genetic Engineering and You*, only turned into a novel of the *Brave New World* genre, with a James Bond book on international crime and espionage and you get an idea of Lind's book – a ripping yarn.

The hero, Elliott Chapman, is doing a graduation project but once too often manages to annoy his supervisor, a soul already sold to corporate biotech. Threatened with expulsion, the student does a deal with the college that takes him with his genetics expertise to the HQ and Mexican field station of Magalto (alias Monsanto?) to sort out a technical problem for the company. Improbability piles on improbability as Elliott is entangled ever deeper in the power-politics of the Latin American drug scene and of a transnational corporation intent on domination of the world food supply chain.

Lind weaves into his story lots of pros and cons of GM crops – mostly the cons – and addresses corporate control of the seed supply, of government and even of the World Trade Organisation.

As in the case of *Brave New World*, the polemical aspect prevents the book from being a true novel. But as the USA public are still largely unaware of genetic engineering this book could nevertheless prove to be a useful tool for drawing their attention to the issues.

It was a pleasant surprise to find in the plot two topics which are less commonplace amongst the large number of books on genetic engineering, fiction or non-fiction. One is that ethics per se is addressed. In one of the dialogues between tutor and student (p. 84) the author appears to argue that ethics is normative and morals are personal principles. But any hint at the higher status of morals in ethical individualism is unfortunately cancelled by making them into principles. The other topic is to do with the genes versus context controversy. J. Cairns' work is mentioned which shows that as well as random mutations the genome is capable of adaptive mutations in response to environmental stress. It suggests that the organism controls its genome, rather than the other way round. This topic is briefly reviewed by Craig Holdrege in the most recent issue of *In Context* (Newsletter of The Nature Institute; <http://natureinstitute.org>, fuller details in the 'Publications' section below). Sadly, Lind cancels this interesting contribution out by making Elliott say 'DNA, the essence of life...the basic blueprint of life'. Even biotechnologists don't subscribe to this erroneous view of DNA, but it will probably take a few generations to eradicate the view from the public consciousness.

There are two important things which mar the book. One is the high number of mistakes in the text. The most glaring mistake is that the publisher has half undone the pun in the book's title by putting 'Barron' instead of 'Baron' in the page headers. There were several howlers such as 'under the allusion' (p.41); 'rocked on his heels' (p.57), and, for the specialist, 'colour chromatography' (p.199). The latter brings me to the other problem. The dialogues involving science were very often unconvincing. This does not detract from the plot, at least not for the lay reader. Any science mumbo jumbo in these passages would probably suffice. But sentences such as 'The plants were crossing genetic lines and producing phylogenies that were completely foreign' and 'So now the farmers

have to buy their own seed that they used to germinate themselves' (both p.179) could seem somewhat sloppy even to the lay reader. What does the author mean here?

Despite the shortcomings I found the book sufficiently entertaining to read it to the end, and it is certainly full of humour, for instance where the hero takes over the kitchen of a restaurant and does a DNA extraction from liver using the ordinary chemicals and equipment that happen to be to hand. I understand from the author that he is hoping for a reissue only this time with a higher profile publisher. If it happens, my recommendation is first to enlist the services of a biotechnologist to get the science passages right and then those of a proof reader to sort out things like 'this data' (p.179). *David Heaf*

Publications

Anthro-Tech News

No. 9, Spring 2004: Editorial: The DewCross Research Company Ltd.; Research at Anthro-Tech – how far have we come? 'Developing Moral Technology is a long term project ... it does not consist of discovering how a "Strader machine" or a "Keely machine" works, and then building one... Research at Anthro-Tech has covered a lot of ground in the 15 years since the project started. Some of the practical developments such as the *Harmogyra*, which is a spin-off from the main line of research, have been presented to the public. [...] This is the most explicit and detailed report of research at the Anthro-Tech Institute that we have published so far.' This 16-page issue gives a historical overview of the work at Anthro-Tech including its background in indications by Rudolf Steiner, Helena Petrovna Blavatsky and the work of John Worrell Keely. Edited by Paul Emberson, it is published in English, French and German roughly once a year. Contact: Anthro-Tech News, CH-1669 Les Sciernes-d'Albeuve, Switzerland. Fax: +41 26 928 22 24.

In Context, The Newsletter of the Nature Institute

No. 12, Fall 2004: As well as short items of news, reviews and comment, the publication carries the following two feature articles: Genes are not immune to context, *Craig Holdrege*; The giraffe in its world, *Craig Holdrege*; Quantum puzzles, *Steve Talbott*. 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: www.natureinstitute.org. The Nature Institute's online *NetFuture* newsletter is available at www.netfuture.org.

Elemente der Naturwissenschaft – now with larger format and font.

No. 81, 2004: Strömungsvorgänge beim Tropfbildversuch und Beziehungen zwischen Probe, Strömungsprozess und Bild, *Andreas Wilkens*. Cupric chloride crystallisation with additives and its applications, *Jean-Georges Barth*. Zur Evolution der organismischen Autonomie: Teil 1: Begriffsbestimmung und das Beispiel der Entstehung der Metazoen, *Bernd Rosslenbroich*. Das Rätsel der physikalischen Ursache, *Hermann Bauer*. Conference proceedings on picture-forming methods: presentations by *Dorothea Dorn*, *Uwe Geier*, *Christine Picariello* & *Michael Jacobi*.

Editorial board: Johannes Wirz (editor-in-chief), Birgit Althaler (editorial assistant), Haijo Knijpenga, Johannes Kühl, Barbara Schmocker.

Subscription enquiries to: Goetheanum, Abo-Service, Postfach, CH-4143 Dornach 1, Switzerland. Email: abo@goetheanum.ch. Tel: +41 61 706 4467. Fax: +44 61 706 4465.

Orders for back/single issues 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): €20.- / CHF 32.-. Single issues: €12.- / CHF 18.- ISSN 0422-9630.

A list of the contents of all back issues is available at

Mathematisch-Physikalisch Korrespondenz

No. 218, Autumn 2004: Die kontinuierliche Vermittlung einer Polarität, *H. -J. Stoss*; Das Phantom der Information – Wir leben nicht in einer zufälligen Welt, *I. Hartmann*.

No. 219, Winter 2004/5: Classification of real projective pathcurves, *Lou de Boer* (47 pages).

Subscriptions are SFr 45/€25 per year.

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

Wasserzeichen

Nr. 21 (2004): Tragen und Schwingen von Wasser – unser Beziehung zum Flüssigen, *Andreas Wilkens*. Ideen Novalis' über das Wasser, *Georg Sonder*. In addition to the articles in this in-house magazine, its 62 pages have many shorter contributions including items on the Flow Research Institute's work, conferences and publications. Price €2.00 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.

Tycho de Brahe Jahrbuch für Goetheanismus

2003: Der Kausalitätsbegriff in seinem Verhältnis zum Vitalismus, *Gerbert Grohmann*; Chronobiologie ist Ätherforschung, *Wolfgang Schad*; Hygiogenese und Salutogenese – Versuch einer (notwendigen) Begriffsdifferenzierung, *Christoph Gutenbrunner*; Über Methoden zur Erforschung hygiogenetischer Prozesse, *Christian Heckmann*; Morphologische und physiologische Mosaikbildungen in den Familien der Loranthaceen und Viscaceen, *Thomas Göbel*; Die Eischalen-Struktur der Reptilien als ein Bild tierischer Konstitution, *Roselies Gehlig*.

2004: Jahresrhythmus und Schilddrüsen-funktion unter besonderer Berücksichtigung des Morbus Basedow, *Christian Heckmann*; Chronobiologische Aspekte der Schmerzempfindung, *Christoph Gutenbrunner*; Die Zunahme morphologischer und physiologischer Autonomie bei den Volvocales, *Bernd Roßlenbroich*; Das Geheimnis der Armleuchter-algen (Characeae), *Hans-Christoph Vahle*; Von Bärlappen, Mondrauten und Nattern-zungen, *Wolfgang Schad*; Zur Begriffsbildung für die funktionellen Gruppen organischer Stoffe aus biologischen Prozessen, *Ulrich Wunderlin*; Der Flüssigkeitsorganismus des Menschen, seine Organe und Organfunktionen als Grundlage des Fühlens, *Thomas Göbel*; Die Eurythmie will durch Bewegung das Geistige ins Materielle überführen, *Thomas Göbel*.

ISSN 0177-168x. Edited by Rolf Dorka, Roselies Gehlig (Editor-in-Chief), Thomas Göbel, Angelika Heinze & Hans-Joachim Strüh. Tycho de Brahe Verlag GdBR, Am Eichhof, 75223 Niefern-Öschelbronn, Germany. Contact: Dr. Roselies Gehlig, Email: cg.carus (at) t-online.de.

Anthroposophy has something to add to modern sciences, Rudolf Steiner, GA 73

The volume includes two series of public lectures given in Zurich. The first four, from 5-14 November 1917, were given at the request of young anthroposophists connected with the university. The next four lectures, from 8-17 October 1918, largely continue the previous series, though they were in part given without specific reference to one of the sciences.

Rudolf Steiner showed very convincingly in these lectures that the methods and findings of anthroposophical spiritual science may be seen as a vital contribution also in the spheres of academic sciences. It is a central aim in anthroposophy to enhance human powers of perception beyond the limits set in purely intellectual thinking. This is of vital importance also for the problems faced by scientists today. Rudolf Steiner's statements relating to this are as significant today as ever and in fact gain more than ever in importance, an urgency if we consider recent scientific developments.

'My aim in giving these lectures has not been to fight other sciences or go against them in any way but to show ... that I appreciate them. I

believe they are great not only in what they are today but also in what may still develop' *Rudolf Steiner* (lecture given on 14 November 1917) 320 pages, paperback, ISBN 0-9578189-4-7. Translator Anna Meuss.

This and several other science-related titles by Rudolf Steiner is available from Completion Press, M.S. 905, Lower Beechmont 4211, Australia. Phone +61 7 5533 1177. Fax: +61 7 5533 1108.

IZF.info

A German language newsletter for holistic science. Topics in the October 2004 edition: art meets science; radionics and homeopathy; Glauber and his salt; fungal antibiotics. Web site: www.izf.eu.tc. Email: newsletter-izf (at) geromont-petite-lux.com.

Membership

We welcome Gordon Woolard (UK) as a rejoining member. The Group has 68 subscribers. The membership subscription is £5 (UK), £6 (Europe) or £7 (elsewhere).

Treasurer's Report

Accounts for the year 1 January to 31 December 2004

Opening balance £2,089.68

Expenditure

Fee to NNA for web site £60.00

Derek Forman's conference initiative £387.66

Henry Goulden's conference initiative £286.00

Office, Newsletter, 'Archetype' £481.94

Total £1,215.60

Income

Archetype sales £194.03

Membership subscriptions £417.14

Conference fees (Derek Forman) £360.00

Printer use £47.40

Donation £10.00

Science Forum sales £11.50

Other £11.56

Total £1,051.63

Closing balance £1,925.71

Deficit for 2004 £163.97

The membership subscription to the group has remained unchanged for 10 years. With the current reserve of around £2,000, and despite having subsidised two conference initiatives by members in the past year, there is no need to increase the subscription for the foreseeable future.

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 2005.

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