Science Group of the Anthroposophical Society in Great Britain
Newsletter – September 2006

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News

Change in the Science Group's website URL
Our Internet service provider has had to make a slight but important change to the URL of our website. Henceforth it will be http://www.science.anth.org.uk. If any members have science- or mathematics-related web pages or sites which seem relevant to the general aims of our Group they are invited to suggest a link from the Group's site. Contact: David Heaf – 101622.2773 (at) compuserve.com.

Novalis' *Das Allgemeine Brouillon* now published in English
Science Group member David Wood's complete translation of Novalis' *Das Allgemeine Brouillon* will be published in English in January. Details and a summary are in the 'Publications' section below. David writes that in the Appendix of the book he has also included a large number of fragments from Novalis' *Freiberg Natural Scientific Studies*, two of which were published in this newsletter in March 2001.

Calling geologists
Frank T. Fawcett is a geologist in California who recently joined the Science Group, and is interested in corresponding with others in the Group who have an interest in geology as it relates to anthroposophy. His e-address is:
FThFawcett (at) aol.com.

Correspondence
(The following item is deleted from the web edition at the author's request.)
Image and colour *by Malin J. Starrett*

The Russian pyramids *by Roger Taylor*

The purpose of this short article is to introduce a recent development in Russia, which seems to me of great importance, both theoretically and practically – even, dare I suggest, for the future of the earth. Under the direction of certain physicists, principally Professor Alexander Golod, a number of very large pyramids have been built in Russia – the largest being 44 metres high. A variety of interesting effects, both physical and biological, have been recorded, both inside, and in the region surrounding these pyramids. Of hollow fibreglass structure, they are 'sharper' than the ancient ones at Giza, but are based on the same geometry. (There is some controversy over whether the Giza pyramids were based on pi or phi, because these two constructions are so close). The Russians base theirs an phi and orient them north-south like those at Giza. Since at present no extended scientific articles are available in English, my information comes from the websites given below. Significantly, an American group has linked up with the Russians, and is actively seeking financial support for more research – particularly into physical phenomena which, it is thought, might be associated with the Egyptian pyramids.

   The most extended account of the effects of the pyramids is given in the article by Dr Volodymyr Krasnoholovets, who is one of the top theoretical physicists in the Ukraine. Tantalisingly, he gives only a short paragraph on each of these effects, and with little in the way of quantitative data, and no statistics. Nevertheless, an impressive list is given of names of Russian scientists involved, and of scientific institutes brought in for research needing specialist expertise.

   Among the many physical effects recorded were:

- Water (either distilled, or commercial mineral water) placed in the pyramid did not freeze in the Russian winter — even down to –38 degrees. Instead, it entered a super-cooled state, from which, on striking the container it rapidly solidified.

- The properties of several materials were changed, so that, for example, electrical resistivity of carbon was increased 2x, and that of silicon reduced 10x. Among the other findings were changes in the half-life of radio-carbon, in the optical properties of crystals and in the strength of concrete

– presumably when it was allowed to set within the pyramid.

- Radar detectors revealed a column, presumed to be of ionised air, rising up to as much as 1,000 m from the pyramid's apex.

And among the biological effects:

- Seeds of more than 20 crop varieties were kept in the pyramid for 1–5 days, before being sown over tens of thousands of hectares. All of them showed growth increases of 20–100% by comparison with controls.
- Mice were infected with a range of doses of the pathogen *Salmonella typhimurium*. Those kept in the pyramid showed greatly increased resistance. Thus, at one dose-level, 60% survived, compared with only 7% of controls. Mice also became more resistant to induction of tumours by various carcinogens. Presumably following the first encouraging results, a number of smaller pyramids have been built in various parts of Russia.

One 12 m pyramid on a state farm has augmented the production of wheat four times. Another in a region with oil wells resulted in a 30% decrease in viscosity of the oil, with consequent increase in productivity. A complex of pyramids in the Arkhangelsk region has helped to clear a blow-well from heavy metals. Another, near Moscow, has reduced the salinity of the ground water.

After storage in the pyramid, granite rocks were found to exert an influence similar to that of the pyramid. Thus when circles of such treated rocks were placed around fields, the crops within them grew better. In this way the influence of the pyramid can be spread over wide areas. More than 40 such circles have already been made in the Moscow region during the period 1997-1999 – and presumably there will be many more by now. Each consists of 50 to 300 rocks, with total weight 20–200 kg. The incidence of epidemics is being recorded, in anticipation that this will decline as the number of circles goes up. After one such circle was set up around a prison, the behaviour of the inmates was noted to improve.

Dr Krasnoholovets also reports in some detail a successful attempt to reproduce the well-known claim that razor blades kept in a small pyramid become sharpened (In this case merely two glass plates with upper edges bonded at the correct angle, and oriented N–S.). The scanning electron-micrographs of his results are quite impressive.

Such a great project, requiring very considerable funding, would not have been undertaken without a secure backing in theory. This, as briefly described by Dr Krasnoholovets, is based around a new understanding of space in terms of fundamental quasi-particles called inertons. In the form of waves, these can influence the properties of matter. A coherence and directionality to these waves is imposed by the rotation and orbital movement of the earth through space. It is argued that the pyramid shape has the observed effects because it serves is a resonator for these earth-oriented waves. Inerton theory now seems quite highly developed, and has been published in English[1]. It may account for many anomalous phenomena, including for example geopathic zones and dowsable earth-energies. Of great significance is the fact that inerton fields can now be detected with instruments. It is hoped to use these to survey the Egyptian pyramids. Moreover, Russian and Ukrainian scientists are now making first steps in a new branch of inerton-astronomy.

On their website, the American group, headed by Dr John DeSalvo, puts out much general information on pyramids, and describes the work using small pyramids (much of it little-known) which has been done during the last century by individual researchers outside acknowledged scientific institutions. As yet the American group has not reported building any pyramids. Dr DeSalvo's book[2] provides a valuable resource on pyramidology. This gives, in addition to the Russian work, a detailed description of the great pyramid, and the history of discoveries relating to it, together with much little known research and theories.

Is there any common factor underlying all these multifarious phenomena? While, on their website, the Russians refrain from speculation, it may be worth noting something which does seem to stand out: most of the effects could be described as 'beneficial'. That is, perhaps, beneficial to higher forms of life, or tending towards higher levels of integration, or a positive direction to evolution. At present, however, though we may have a feeling for them, none of these can be quantified. At one point, the Russians mention how certain wild flowers had reappeared in the vicinity of a 22 m pyramid on the shore of Lake Seliger, which had not been seen in that region for many years. Could the effect even be to restore the complexity of the ecosystem? If so, the implications would indeed be vast. Because some of these claims seem to strain one's credulity, I urge readers to consult the websites below, and communicate their reactions to [*Network Review*].

www.abo.ru – a Russian site

www.gizapyramid.com – an American site: a mine of information – including Dr Krasnoholovets' article.

www.pyramidoflife.com – a Canadian site offering certain products for sale, such as a mini-pyramid energised within the great pyramid.

1. Krasnoholovets & V. Byckov. Real inertons against hypothetical gravitons. Experimental proof of the existence of inertons. *Indian J. Theoretical Physics*. **48** (1) 1–23 (2000).
   [http://arxiv.org/PS_cache/quant-ph/pdf/0007/0007027.pdf]
   Much more information an Dr Krasnoholovets' work available on his website http://inerton.cjb.net/.
2. John DeSalvo. *The Complete Pyramid Sourcebook*. 1st Books, 2003. ISBN 1-4107-8042-2.

Dr. Roger Taylor is a former research immunologist with an interest in non-Hertzian fields.

Reviews

Childhood and Human Evolution by F. Kipp, translated by John Barnes. Adonis Press, 2005 (German original 1991).

This deceptively slim volume, another translation by Adonis in its goal to publish phenomena-centred science books (www.adonispress.org), is an essential read for all who seek firmer ground on the evolutionary position of the human being. It is shorter and much easier to read for the non-specialist than their other excellent choice of translation: *Developmental Dynamics* by Jos Verhulst.

Linking to Wolfgang Schad's work on 'altricial' v. 'precocial' (less or more mature at birth) features of the young animal, Kipp shows how detailed features of human child physiology show 'plasticity' and 'retardation' against the loss of universal forms seen in the animal world.

Chapters focussing on postnatal development, childhood, youth, the head, love and care of the young, fossil evidence and evolution bring a wealth of detail (e.g. anatomical form shows that the human mouth is not primarily for eating!). The issue of uprightness and speech is a valuable contribution from which any Steiner/Waldorf teacher would find firm intellectual support for what can easily degrade into dogma or 'Steinerism' in the lower classes and in the kindergarten.

The final chapter 'Human beings teach their organs' is a Goethean culmination leading solidly from the evidence of the earlier chapters. This book is thoroughly recommended. It

should be on the reading list of all Steiner/Waldorf training courses. *Graham Kennish*

Θεὸς ἀεί γεωμετρεî

An extended review of *The Vortex of Life – Nature's Patterns in Space and Time* by Lawrence Edwards, edited by Graham Calderwood. 2nd ed., Floris Books, 2006, ISBN-10: 0-86315-551-0, ISBN-13: 978-086315-551-2, 379 pp.

'God geometrises', a remark attributed to Plato, at least since Plutarch, might be the appropriate motto of the field of morphometrics to which this book very clearly belongs. In approach it can be justifiably grouped with D'Arcy Wentworth Thompson's *On Growth and Form* first published in 1917[1]. Surprisingly, Edwards makes no mention of his fellow countryman's seminal work, whereas the field of geometric morphometrics, which has expanded rapidly since its 'revolution' in the late 1980s to early 1990s (see fig. 1), ranks Thompson amongst its pioneers. I will return later to the matter of the contemporary context of Edwards' work.
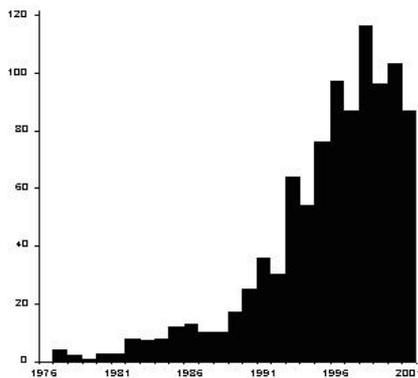
Figure 1. Geometric morphometric citations per year from 1976 to 2001.[2]

Edwards published the early part of his morphometric work in the 1975 and 1978 issues of *Mathematical and Physical Correspondence* edited by Stephen Eberhart, and in his book *The Field of Form* (Floris Books, May 1982). Surprisingly, *Science Forum*, the Science Group's only publication at that time, did not review it, but it was reviewed by Nick Thomas in *The Anthroposophical Review* (**5** (3), 1983, p.35). Reports on the work since 1982 did, however, appear in *Science Forum* in 1985 and 1987. In the first edition of *The Vortex of Life* in 1993 (Floris Books), Edwards gave a more comprehensive presentation of what by then was nearly thirty years of research. This was drawn to the attention of a wider public by a review in *New Scientist* in that year. It was also reviewed by Douglas Caughill in *Anthroposophy Today* (**24**, 1995). Caughill writes 'He makes a valiant effort to make this understandable to the lay reader such as myself. I found this part of the book quite difficult, but was able to get the general gist of it.' Indeed, Edwards aims in *The Vortex of Life* to give 'as clear and vivid an account ... as possible to the lay reader' and has rewritten the main body of the book with the non-mathematical reader wholly in mind.

However, to get the most out of this book, readers will need to be prepared to make a certain amount of effort in thinking and imagination, especially in Chapters 1 to 4 on the basic projective geometry necessary for understanding path curves – which, incidentally, according to Edwards are not dealt with in English-language textbooks of projective geometry (p. 263) – and in Chapter 9 on the pivot transformation. Nick Thomas has created a vividly illustrated web site on the projective geometry necessary for understanding such curves and transformations[3]. Once these chapters are grasped, the reader has the

basic tools of the kind of geometric morphometrics that Edwards applies to his studies of objects from the living world: tree leaf buds, flower buds, eggs, the embryo, hearts, etc.

We are justified in placing this work in the field of geometric morphometrics as it clearly seeks to preserve geometric relations throughout the measurements, mathematical treatments and comparisons that are made. Before the aforementioned 'revolution', traditional morphometrics was largely confined to measurement of lengths and angles relating only to *parts* of biological forms[2]. Edwards uses a form parameter, lambda (ë), which contains information on the *whole* form – albeit projected onto two dimensions – of the object under study.

Another aim of the book is 'to encourage mathematically inclined readers to take such lines of research for themselves'. To this end, there are 84 pages of appendices containing more detail on the projective geometry of path curves and the pivot transformation, the algebraic notation for the forms and a few BASIC computer programs. The derivation of ë for path curves in two and three dimensions respectively is given in Appendices 1 and 2. How ë is determined from specimens, for example buds or asymmetrical forms such as the heart, is explained in Appendix 3, together with methods for calculating the goodness of fit, i.e. how close the biological form is to a path curve. The algebra is relatively simple and computer programs or spreadsheets can readily be devised to process the digitised information from images of specimens. A further 80 megabytes of files on the results of Edwards' research since the first edition of *The Vortex of Life* are downloadable for free at www.florisbooks.co.uk.

Edwards points out that it was George Adams, his mentor in the study and application of projective geometry, who drew his attention to the resemblance between path curves and forms in nature such as eggs or pine cones. In *The Plant Between Sun and Earth*[4], George Adams and Olive Whicher show the usefulness of projective geometry for not only contemplating organic form but also understanding how it comes about through the influence of etheric formative forces. But nowhere in that book, much of which one could classify as geometric *morphology*, is there any mention of actually measuring the forms to see if they are path curves. That was Edwards' own discovery and it represents the transition to geometric *morphometrics*.

His early researches up to 1987, involving black-and-white photography of buds and subsequent measurement of the photos with a hand lens, seem very laborious compared with his later technique with a video camera linked to a PC equipped with digitiser software and programs for processing the data. Eggs, pine cones and many buds showed mean deviations from ideal path curves of 1% or less.

What does Edwards claim regarding the relationship between the nature of the interaction between the geometry and the biological form? This is what he says in the summary of Chapter 5 (p. 86): 'I think that we can now really say that these path curves and their related surfaces, arising as they do from the simplest, most elementary mathematical thought-forms, are significantly at work in the realm of these opening buds'. By 'at work' Edwards, at least in my reading of him, does not necessarily imply a primary causal relationship between the path curve form and the observable biological form. Thompson takes the view that 'no organic forms exist save such as are in conformity with physical and mathematical laws' (p. 10). An organism obviously cannot manifest in a material world without obeying such laws. The following diagram, based on Goethean theory on the growth and development of organisms, and clearly an expansion of the nature/nurture polarity, may help to clarify this (fig. 2):[5]
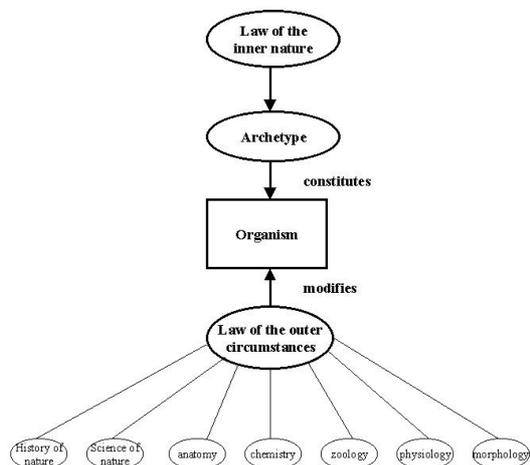
Figure 2. Goethean theory of the organism

So far as the organism is concerned, the outer circumstances, which no doubt include physics and mathematics in addition to those categories listed, are *modifiers* and do not *constitute* the organism. Indeed, Edwards later states 'I believe that something is at work in the plant that has the qualities of pure form, divested of any spatial limitations (apart of course from form itself); that this can be brought to visible manifestation by the organism of the plant, when it immediately and necessarily accepts limitations of place and size...' (p. 167). However, he later qualifies the relatively cautious term 'at work' with the assertion that 'just the pure *form* of the bud, considered as a thing in itself, can act in some way as a medium, a bearer, of life force' (p. 265). We should note here that by 'life force' he is not reviving the old, and justifiably discredited, vital force theory but referring to etheric formative forces which have to be conceived in a very different, non-materialistic, way (see, for example, Ref. 6).

Chapter 6 briefly covers path curves in other kingdoms of nature and Chapter 7 goes into flower buds. Here we are reminded of the anthroposophical background of the work, Rudolf Steiner having already been mentioned in the 'Introduction'. Anthroposophy is an essential part of the thinking in this 'stream' of morphologists stemming from George Adams who wrote: 'Modern, synthetic geometry, as Rudolf Steiner pointed out, is in fact one of the few really creative deeds of our epoch in the forming of pure thought as such. But it will only prove its fruitfulness in a wider aspect when we are ready to perceive its fundamental notions in the concrete light which is already now made possible by spiritual science'[7].

Chapter 8 reports results of Edwards' work on sheep hearts and human angiograms and the work by J. Bell Pettigrew on heart morphology. Hearts do not fit path curves quite as well as buds but this may be attributable to the complexity of the organ with its valves and blood vessels. Even so, from the angiograms, Edwards is able to give preliminary evidence of a sevenfold pulse in the change in ë during a complete heart beat. All this was done by hand with tracings from images. In a short supplement to this Chapter, Graham Calderwood not only provides further evidence of the sevenfold 'beat-within-a-beat' using a computer to converge on the best-fit path curve in video ventriculograms, but also shows from analyses of these data that in each beat the heart briefly 'converts from ram-pump to hammer ... in order to .. supply just-delivered blood with energy enough to re-inflate the system'.

Chapter 10 brings Edwards' next brilliant discovery, the pivot transformation that allows the form of the seed-bearing organ of the plant, for example rose hip, to be derived from the path curve form of the bud. The discovery resulted from a

search for the link between space and counterspace (negative, anti-, ethereal space, *Gegenraum*), the infinitude within that George Adams had intuited lay within plant buds, a point towards which he conceived that etheric formative forces stream peripherally and which lies in the cavity above the meristem (see for example Ref. 3, p. 120). The transformation involves a 'watery vortex' and it is no doubt this that lies behind Edwards choice of title for *The Vortex of Life*. Incidentally, as we read in Chapter 11, a vortex in water flowing from a vessel also fits a path curve. Furthermore, a vortex placed asymmetrically in relation to the transforming form, in this case the human uterus, and allowed to move gradually in steps, results in a series of forms bearing a remarkable resemblance to developing embryos (Ch. 12). To reproduce the formation of the neural canal, which closes in opposite directions, requires two vortices in the pivot transformation (Ch. 13).

Chapter 14 presents the work that immediately led up to what is by far the most extraordinary – 'revolutionary' is the word the author uses – of Edwards' principal discoveries. It comes in Chapter 15, the culmination of the book, and describes the correlation between cyclic variations over time in the value of ë of tree and flower buds with alignments between the moon and the planet associated with a particular plant species, be it oak (see fig. 3), beech, cherry, primrose, knapweed, geranium or stichwort. In the later phase of his work, these findings required digitisation of image data and ë calculations for 20 buds per species daily for a large part of each year in succession.
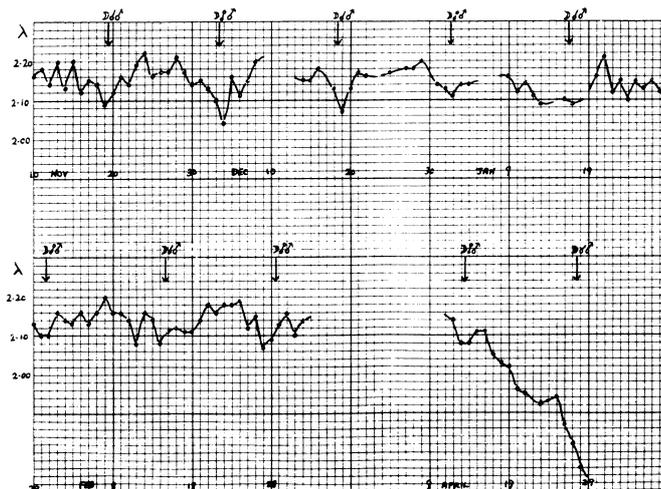
Figure 3. Oak bud daily mean ë values (y-axis) from 10 November 1982 to 29 April 1983 (x-axis) showing Moon-Mars alignments with arrows (top)[8].

The phenomenon has since been confirmed by researchers working elsewhere and extended to mistletoe berries by Stephan Baumgartner and colleagues who found that their ë values correlate with the position of the moon in the zodiac but not with alignments of the moon with any particular planet[9,10].

Within a couple of years of making his discovery, Edwards realised that the dips in ë were shifting out of phase with the planetary alignments. He continued collecting data up to 1999 and Graham Calderwood studied them by a number of methods to try to account for the phase shift in terms of phenomena in the solar system. Calderwood's findings are summarised in a supplementary section at the end of Chapter 16 and the calculations given in an appendix. His most promising observation so far is that the phase shift, which is independent of plant and planet, correlates with the squared cosine of the bisector of the angle between the line linking the mean position of planets to the sun and the line giving the direction of the acceleration

vector of the centre of inertial mass of the planets (see fig. 4). This appears to be a good fit for all species/planets but when applied to an individual plant and planet, for example beech and mars, it is not a reliable predictor of phase shift.
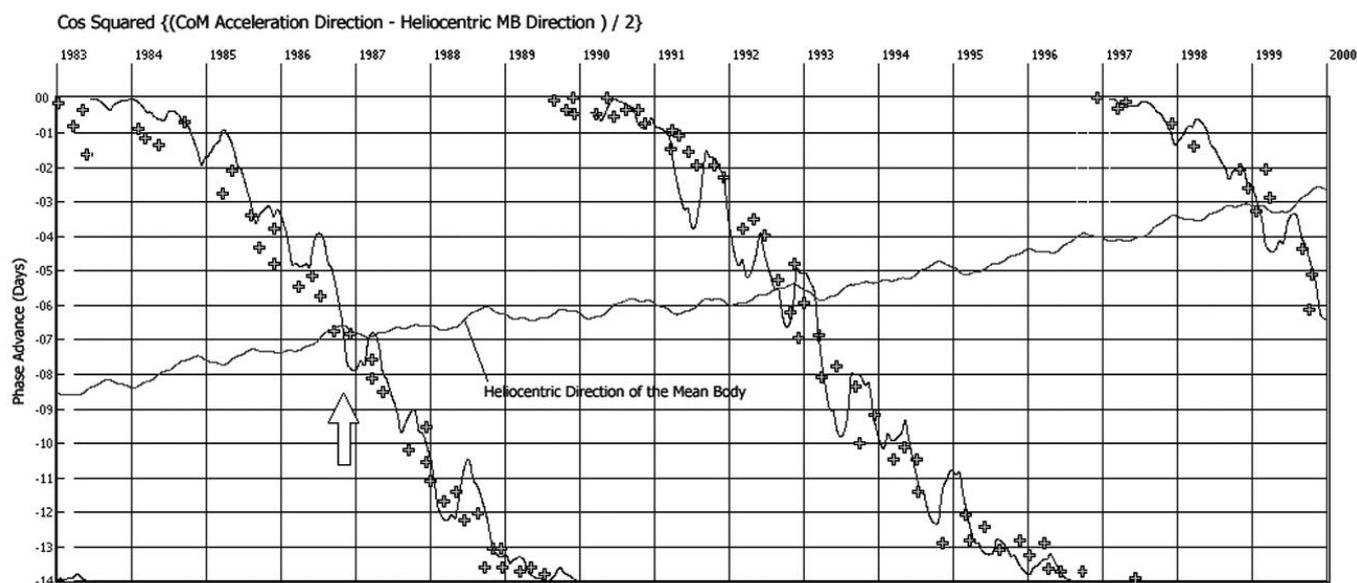
Figure 4. The crosses show the observed phase shift (advance) in days from 1983 to 2000 overlain by a wavy line representing the chosen function of mean position and direction of the acceleration vector of the centre of inertial mass of the planets. Based on 40,000 measurements. Reproduced here with permission from Floris Books. This diagram was produced by Graham Calderwood.

In the final chapter, Edwards turns to broader considerations, including methodology and interpretation. Here occurs his only reference to mathematics applied to morphology outside the Steiner/Adams/Whicher/Edwards stream. He acknowledges contemporary interest in fractal geometry applied to organic morphology and draws attention to the fractal and, after Steiner, threefold nature of the human form and its inversion in the plant. In a passage on causality, he is cautious about claiming a causal relationship between the planetary alignment and ë, especially as the phase shift means that the supposed effect may precede the supposed cause.

Stylistically, the book is somewhat removed from scientific writing. Indeed, in places, it borders on autobiography. But this adds to its vividness. We accompany the author on his explorations both in thought and amongst the phenomena. Some lines of enquiry turn out to be fruitless and as such would be excluded from peer reviewed publications. Some passages may seem like musings, even whimsical, although they will appear less so to readers familiar with Rudolf Steiner's anthroposophy. What is clear is that Edwards has left posterity with a clear account of his research and methods. It raises many questions and these are challenges for whoever wishes to take this work further.

I would like to conclude this review with a few methodological and epistemological considerations. How does Edwards' practical method fit in with contemporary geometric morphometrics? There are basically two approaches – outline and landmark – either of which can be two or three dimensional. The outline approach digitises points along an outline, fits the points with a mathematical function (usually some form of Fourier analysis), and then compares curves by using the coefficients of the functions as shape variables in multivariate analyses. The landmark approach looks for biologically definable points, for example the intersections in insect wing veins, removes non-shape information from the data, and compares by superimposition methods such as Procrustes

analysis. It appears that Edwards' approach is a hybrid of outline and landmark. To find the path curves from which ë is derived, he fixes two biologically definable points on the image of the specimen which become the corners X and Y of the invariant triangle or tetrahedron. These are clearly landmarks. It is not always easy to find these points for determining the real part of the invariant tetrahedron, as he points out on page 173. The remaining points that are digitised are on the curved outline of the image of the specimen. Any number of these could be chosen but, in practice, Edwards has found that seven pairs evenly distributed along the specimen are sufficient.

It is also interesting to compare Edwards' thinking with that of Thompson. Thompson wants 'to see how...the forms of living things...can be explained by physical considerations' (ref. 1, p. 10) and, using the term 'force' as the physicist does, asserts that the 'form...and the changes of form...may in all cases alike be described as due to the action of force' (Ref. 1, p. 11). So with Thompson's thinking one might see the path curve shape as resulting from physical forces, for example those exerted largely from within the specimen. The broader part of the shape, for example the base of the bud or the top of the heart, may correspond with the end from which matter flows in. But Edwards, as we have seen, regards the pure form as the *mediator* of the etheric formative forces. These approaches may not be as irreconcilable as they first seem, but it requires a somewhat more imaginative cognitive method to study the etheric[11].

Thomas devotes half his review of *The Field of Form* to the particular scientific method behind Edwards' research. Edwards himself discusses the matter in the 'Introduction' of *The Vortex of Life* and concludes that his method is 'polar-Goethean'. I read this in the sense of it being the complement of Goethe's method. I understand Edwards' method to be the following: on the one hand he understands certain geometric forms which can in principle be arrived at and manipulated by pure thinking, i.e. even without creating perceptible marks on

paper. On the other hand he observes that certain objects in the natural world are reminiscent of particular geometric forms. He hypothesises that the geometric forms are 'at work' in the objects and sets out to test the hypothesis by measuring samples of the objects and applying the relevant geometric, algebraic and statistical procedures. He finds at the end of the exercise that for many of the objects the hypothesis still stands. One can imagine the same procedure being applied to the video of the form of the trajectory of a ball thrown into the air. Pure thought allows one to hypothesise that the form is a parabola. Measurements of the trajectory confirm this, though deviations may occur due to air resistance or wind. Here, we are dealing with the normal and obviously very fruitful scientific approach, i.e. combining quantitative and qualitative aspects. In contrast, Goethe proceeds by direct contemplation of the phenomena of objects of organic nature and, using exact sensorial imagination, arrives at the unitary principle, the type or idea, of which the objects are an expression. Such an approach would be no use in determining whether the form of a bud is a path curve. Indeed, Goethe did not use mathematics in his scientific research. However, his studies of organic nature did include the processes of making inferences, comparisons and combinations – all of which are essential to the normal scientific method and cannot be made arbitrarily. Indeed, we should bear in mind the following quote from him: 'The circumspection of inferring only the next from the preceding we must learn from the mathematicians, and even where we use no computation, we must always proceed in the same way as if we were obliged to give account to a strict geometrician'[12].

1. Thompson, D. W., *On Growth and Form.* Cambridge University Press, 1961.
2. Adams, D. C., Rohlf, F. J. & Slice D. E. Geometric Morphometrics: Ten Years of Progress Following the 'Revolution' *Ital J Zool*, **71** 5-16 (2004).
3. http://www.nct.anth.org.uk/
4. Adams, G. & Whicher, O. *The Plant Between Sun and Earth.* 1st ed: Goethean Science Foundation, 1952; 2nd ed: Rudolf Steiner Press, 1980.
5. Richter, R. Phenomenological studies on transgenic potatoes: genetic modification adds more than intended traits. In: Heaf, D. J. & Wirz, J. (eds.) *Genetic Engineering and the Intrinsic Value and Integrity of Animals and Plants – Proceedings of a Workshop at the Royal Botanic Garden, Edinburgh, UK, 18-21 September 2002.* (Image compiled by Johannes Wirz)
6. Steiner, R. *Theosophy – An Introduction to the Supersensible Knowledge of the World and the Destination of Man.* Rudolf Steiner Press, 2005.
7. Adams, George, *Physical and Ethereal Spaces.* Rudolf Steiner Press, 1965.
8. Edwards, L. Variations in the forms of plant buds. *Science Forum* No. **5**. 2-11 (1985).
9. Flückiger, Heidi and Baumgartner, Stephan. Shape changes of ripening mistletoe berries *Archetype* **9** 1-13 (2003).
10. Baumgartner, S., Flückiger, H. & Ramm, H. Mistletoe berry shapes and the zodiac. *Archetype* **10** 1-20 (2004).
11. Bockemühl, J. (ed.) *Towards a Phenomenology of the Etheric World – Investigations into the Life of Nature and Man.* Anthroposophic Press, 1985.
12. Goethe, J. W. von (1793) 'Der Versuch als Vermittler von Objekt und Subjekt', in *Goethes Morphologische Schriften,* Jena, p. 279. Quoted in Steiner. R. (1950) *Goethe the Scientist.* GA 1, trans. Olin D. Wannamaker. Anthroposophic Press, NY, p. 189.

David Heaf

Meetings/Conferences

Research Group
There will be a meeting for members of the Research Group on Saturday 9th September 2006 from 9.30 am. to 4.30 pm. at the Centre for Science and Art, Stroud.

Desmond Cumberland will present a DVD entitled *Finding Rudolf Steiner* by Prof. David Antelli, University of Windsor, Ontario. The agenda includes reports from members of the Research Group and continuing discussion of its intention of establishing a Centre for Scientific Research in the UK. For further information about the meeting and/or joining the Research Group, please contact Henry Goulden, The Chapel, Treligga, Delabole, Cornwall, PL33 9EE, Tel. 01840 212728.

UK Group of the Science Section
The Science Section for members of the School of Spiritual Science who are taking responsibility for the scientific work has been meeting twice a year in autumn and spring. We are currently looking at phenomenology as a spiritual path focussing on genetics and inheritance, but usually discuss other areas of common interest as well.

Our next meeting is on 18 November 2006 (N.B. postponed from 21 October) at Elmfield School, Stourbridge (N.B. venue subject to confirmation). At the following meeting, we hope to have a joint Mathematical and Science Section event possibly at the Pishwanton Project in East Lothian.

If you are interested in attending but do not normally receive notification of section meetings please contact Simon Charter, Juniper Cottage, Ludlow Green, Ruscombe, GL6 6DQ. Tel: 01453 755614. Email: simon (at) ebbandflow.fslife.co.uk.

INTERNET (II) - The Binding of the Human Spirit
22–28 October, An-Tobar Arts Centre, Tobermory, Isle of Mull, Scotland. In English. Based on Rudolf Steiner's Details from: Philippe Rigal, at Anthro-Tech Institute, Tobermory. Tel: 01688 302532.

Courses

Training in astronomy
News of these two courses arrived too late to go in our Spring issue. We include brief details here in case anyone wishes to enquire about future similar courses at the same venue.

Fortbildung in Astronomie I (Unterstufe) 3-8 September 2006 and *II (Oberstufe)* 10-15 September 2006 are given by the Mathematical-Astronomical Section at the Goetheanum, Dornach, Switzerland. The contributors are Liesbeth Bisterbosch, Thomas Schmidt and Oliver Conradt. They cost 270 Swiss francs each (students 180 CHF).

The contact details for more information are Tagungsbüro am Goetheanum, Postfach, CH-4143 Dornach, Switzerland Tel: +41 (0)61 706 4444, fax +41 (0)61 706 4446. tagungsbuero (at) goetheanum.ch.

Liniengeometrie – Line Geometry
A mathematical workshop, 11-14 October 2006, given by the Mathematical-Astronomical Section at the Goetheanum, Dornach, Switzerland. Contributors: Lou de Boer, Uwe Hansen, Nick Thomas and Oliver Conradt. Cost 220 Swiss francs (students 120 CHF). Contact details as with previous item.

A selection from Schumacher College programme January 7-26 2007, Science & Spirituality: Creating a new balance Can science help us appreciate beauty, explore consciousness and live a better life? This course will investigate the compatibility of science and spirituality and ask whether they complement or contradict each other.

Week 1: Science, Spirit and our Future Elisabet Sahtouris will present her view that humanity is moving towards greater global connectivity as a natural, evolutionary process. Course participants explore how to introduce principles of healthy living systems into their family, workplace, and community.

Week 2: The Mysteries of Consciousness Peter Russell will contend that the global crisis we are facing is a crisis of consciousness. He will use methods of dialogue and meditation to explore consciousness and the deep realities of human existence.

Week 3: Different Ways of Knowing Brian Goodwin and Stephan Harding will show how scientific method can be extended into the qualitative and aesthetic domain, drawing from Gaia theory, chaos and complexity theories, Goethean science and land art.

MSc in Holistic Science. One Year: September-August
Schumacher College, in partnership with the University of Plymouth, is the first in the world to offer a postgraduate programme in Holistic Science.

A Science of Qualities. This year-long residential course offers methodologies that go beyond reductionism in understanding the dynamics of whole systems. These are explored at all levels from individual organisms to organisations and from ecosystems to the Earth. Students develop an understanding of holistic principles and learn to work with them creatively.

The MSc in Holistic Science advocates a participatory science of qualities, values and interactions which underpins an ecological world view. The course integrates qualitative and quantitative approaches which include chaos and complexity theories, computer modelling, intuitive perception, collaborative projects and co-operative inquiry.

Information about the programme, including the student handbook, application form, articles of related interest and examples of student work are available on the College web site. Deadline for applications: April 30.

Core Faculty: Stephan Harding, Brian Goodwin, Terry Irwin, Gideon Kossoff. *Visiting teachers regularly include:* Henri Bortoft, Rupert Sheldrake, Margaret Colquhoun, Patrick Harpur, Tchenka Sunderland, Patricia Shaw, Seaton Baxter, Francoise Wemelsfelder, James Lovelock, Arthur Zajonc, Craig Holdrege.

More details: 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
Website: http://www.schumachercollege.org.uk

Publications

Notes for a Romantic Encyclopaedia *by Novalis, translated by David W. Wood,* SUNY Press, $35.00, hardcover, 288 pp. Release date: January 2007, ISBN: 0-7914-6973-5
Summary: The first English translation of Novalis' unfinished notes for a universal science, *Das Allgemeine Brouillon*.

Novalis is best known in history as the poet of early German Romanticism. However, this translation of *Das Allgemeine Brouillon*, or 'Universal notebook', finally introduces him to the English-speaking world as an extraordinarily gifted philosopher in his own right and shatters the myth of him as a mere daydreaming and irrational poet. Composed of more than 1,100 notebook entries, this is easily Novalis' largest theoretical work and certainly one of the most remarkable and audacious undertakings of the 'Golden Age' of German philosophy. In it, Novalis reflects on numerous aspects of human culture, including philosophy, poetry, the natural sciences, the fine arts, mathematics, mineralogy, history, and religion, and brings them all together into what he calls a 'Romantic Encyclopaedia' or 'Scientific Bible'.

Novalis' *Romantic Encyclopaedia* fully embodies the author's own personal brand of philosophy, 'magical idealism'. With meditations on mankind and nature, the possible future development of our faculties of reason, imagination, and the senses, and the unification of the different sciences, these notes contain a veritable treasure trove of richly poetic and philosophic thoughts.

'Wood's translation will radically change our sense of the range and shape of 'philosophy' in German Idealism and Romanticism, and will make a major contribution to our understanding of the stakes and divisions in the encyclopaedic project from the Enlightenment to the present.' – Tilottama Rajan, author of *Deconstruction and the Remainders of Phenomenology: Sartre, Derrida, Foucault, Baudrillard.*

'Wood's excellent translation of a difficult text is of the highest quality and will be of great service to the field.' – Elizabeth Millán-Zaibert, translator of Manfred Frank's *The Philosophical Foundations of Early German Romanticism*

Novalis (1772–1801) was the foremost poet-philosopher of early German Romanticism. Universally acclaimed as a poetic genius for such works as *Hymns to the Night* and the unfinished novel *Heinrich von Ofterdingen*, he especially favoured the fragment form for his philosophical meditations. The latter reach their climax in this volume, his astonishing plan for a universal science. David W. Wood is a PhD candidate in German Idealism at the Sorbonne in Paris. He is the translator of *Goethe and Love* by Karl Julius Schröer.
www.sunypress.edu/details.asp?id=61378

Mathematics in Space and Time *by John Blackwood.* Floris Books, 2006. ISBN-10: 0-86315-560-X, ISBN-13: 978-08631-560-4. £12.99. 110 pp.

This teacher's resource book for mathematics covering 'Platonic solids' and 'rhythms and cycles' is the sequel to John Blackwood's *Mathematics Around Us* which was reviewed in the March 2006 issue of this Newsletter. We hope to review *Mathematics in Space and Time* in the next issue.

John Blackwood worked in mechanical engineering design for nearly thirty years and was inspired by Lawrence Edwards' work with plant geometry. He became a Teacher at Glenaeon Rudolf Steiner School in Sydney, Australia, where he designed the maths course for classes 11 and 12 which was adopted by the school board of New South Wales.

Dokumentation der Untersuchungsstelle für Bildschaffende Methoden an Gemüse – June 2001-June 2005, Dorothea Dorn. This is a laboratory report on the application of picture-forming methods to biodynamic vegetable seed breeding at Kultursaat e.V. It includes a brief description of the methods, 96 illustrations mostly of capillary dynamolysis and copper chloride crystallisation pictures and a list of references. Publisher: Kultursaat e.V., August-Viktoria-Straße 4, 61231 Bad Nauheim, Germany. Tel: 06032 918617. Fax: 06032 918622. kaheinze (at) t-online.de.

In Context, The Newsletter of the Nature Institute
No. 15, Spring 2006: As well as short items of news, reviews and comment, the publication carries the following feature articles: Understanding infection: not a battle but a house-keeping, *Philip Incao*. Conversation between friends and the Goethean method, *Christina Root*. Notes and reviews: The light of sense experience, *Georg Maier*. Will biotech feed the hungry? *Craig Holdrege*.

Editor: Steve Talbott. Single copies of *In Context* are available free of charge while the supply lasts. Contact details: The Nature Institute, 20 May Hill Road, Ghent, NY 12075. Tel: +1 518 672-0116. Fax: +1 518 672 4270. Email: info (at) nature-institute.org. Web: www.natureinstitute.org.

The Nature Institute's online *NetFuture* newsletter is available at http://netfuture.org.

Elemente der Naturwissenschaft
No. 84, 2006: Milch und Denken. Ansatz für einen bildhaften Begriff von Lebensmittelqualität, *Florian Leiber*. Wo singen Vögel und weshalb gerade dort? Die Gesangsstellen der Vögel aus der Perspektive eines erweiterten Begriffs des Singens, *Wolter Bos*. Goetheanistische Chemie im aktuellen Kontext, *Martin Rozumek*.

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

Subscription enquiries to: Wochenschrift 'Das Goetheanum', Abo-Service, Postfach, CH-4143 Dornach 1, Switzerland. Email: abo (at) goetheanum.ch. Tel: +41 61 706 4467. Fax: +41 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 (at) 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 back issues is available at http://www.science.anth.org.uk/elemindx.htm.

Mathematisch-Physikalisch Korrespondenz
No. 224, Spring 2006: Der innere Struktur der Materie I, *P. Gschwind*. Selected topics in three-dimensional synthetic projective geometry, Chapter 2: Projectivities in three-dimensional space, *Renatus Ziegler*.

No. 225, Summer 2006: Der innere Struktur der Materie II, *P. Gschwind*. Polares Verhalten physikalischer Vorgänge, *K. -H. Miklowitz*. Reiche Zahlen – und ganz arme, *B. Ulin*. Selected topics in three-dimensional synthetic projective geometry, Chapter 3: Introduction to curves and surfaces in three-dimensional space, *Renatus Ziegler*.

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 (at) intergga.ch.

Wasserzeichen
Nr. 24 (2006): Menschengedanken zum 'Wassergedächtnis', *Michael Jacobi*. Mineralwasser – Auch auf die Flasche kommt es an, *Wolfram Schwenk*. Der Mäander – nur am festen Widerstand kann er entstehen, *Andreas Wilkens*. In addition to the articles in this in-house magazine, its 62 pages have many shorter contributions including items on the Flow Research In-stitute's work, conferences and publications. Price €3.00 per issue. Free to sponsors.

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

Email: sekretariat (at) stroemungsinstitut.de.

Internet: www.stroemungsinstitut.de.

Membership

We welcome to the Science Group Frank Fawcett (California). The Group has 63 subscribers.

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

Next Issue

This newsletter is issued to members in March and September each year. Copy for the next issue should reach the editor at the address below by 20th February 2007.

Dr David J. Heaf, Hafan, Cae Llwyd, Llanystumdwy, Cricieth, Gwynedd, LL52 0SG, UK. Tel/Fax: +44 (0)1766 523181. Email: 101622.2773 (at) Compuserve.Com.

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