

Science Group of the Anthroposophical Society in Great Britain

Newsletter - March 2004

Contents

Obituary.....	1
News, Comment.....	2
Reviews.....	2
Meetings.....	7
Publications.....	8
Membership, accounts, next issue.....	8

Obituary

Lawrence Edwards

Lawrence Edwards died on 3rd January 2004 after a very full working life. He was born in 1912, was an inspired teacher and mathematician, and was also decorated with the Military Cross for bravery in the 1939-45 war. He was a member of the Anthroposophical Society and both taught and did research on the basis of the insights received from Rudolf Steiner. He was married to Barbara and had five sons.

Lawrence Edwards was widely known in scientific circles within the Anthroposophical Society for his work in applying projective geometry to botany and physiology. He was also known in wider circles, but the timidity of materialism prevented his work from receiving the recognition it deserved. He was gifted at mathematics which he taught at the Edinburgh Rudolf Steiner School for many years, and this gift led him to study projective geometry with George Adams. Every year he would spend a whole week with Adams, and learned about some remarkable curves discovered by Felix Klein in the 19th century, which are now called path curves. Adams was researching them and had lifted them out of their academic limbo into the 'grubby' practical world, having found that some of them closely resemble eggs and vortices. This is true not only in outline but also for the spiralling forms we see for example on pine cones.

Lawrence told us that for many years he taught this to the children, until one day a question took root in his soul: are the forms in nature *actually* path curves, or do they merely resemble them? He found he could no longer teach this without further investigation! Such a question is beset with philosophical overtones of course, but we might also phrase it thus: are there processes in nature which inevitably give rise to path curves *per se*, as a parabola is essentially related to the path of a thrown stone, or is their appearance merely fortuitous? It was in this spirit that he set to work scientifically in the hope of answering the question. His approach was based firmly on the search for process rather than mere form-fitting, a fact which should be borne in mind by pedants who are inclined to dismiss his work or point to 'better' methods of analysis. George Adams had laid a firm mathematical foundation for Rudolf Steiner's discovery of negative space, and the processes we have in mind here weave between the two spaces.

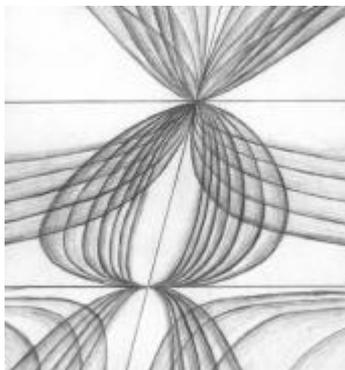
Apparently his house was transformed into a laboratory, with egg profiles being projected onto walls and measured! The initial findings were so promising that better methods were devised, both for measuring and for mathematical analysis. He developed a method for determining the deviation of an egg form from the ideal, and photographic methods for studying tiny plant buds (which are also egg-shaped). The analysis was based on the path-curve process for reasons already stated, which proved to be more sensitive than conventional methods

of error analysis. Do all rose buds, for example, have the same type of path curve? That type is characterised by a number which is named 'lambda' after the Greek letter used to symbolise it. He studied many species but found that lambda varied within each, so although the ranges of variation were characteristic, it was not possible to relate species directly to lambda values. But, variation or no, they fitted the ideal mathematical forms in general very well. He also found that the profiles of the uterus during pregnancy and the left ventricle of the heart are path curves, the latter indeed a varying one! Together with collaborators he showed that water vortices have a path curve profile.

In the early 1980s he was occupied with the question: does the closeness of a form to the ideal relate to the strength of the life forces at work in it? For this he measured the sap content, and used leaf buds on trees through the winter as they are dormant until spring, and thus should provide a stable basis for comparison. To his surprise they proved to be less dormant than expected, the lambda value varying with an approximately two-weekly rhythm. He was quick to relate this to the two-weekly cycle of conjunctions and oppositions of the Moon and planets, which led to an investigation lasting until the end of his working life. Early on he described it to us at a conference, and I remember asking how he could be sure it was one planet rather than another, for example, Mars for oak trees. Fortuitously the alignments of the Moon coincided with the peaks and troughs of the graph showing the variation in lambda, but as the years went by there was a 'slippage' which he called the 'phase shift', whereby the rhythm remained the same but the alignments did not occur at peaks or troughs of the graph. We did not know at the time how long it would take for synchronisation to be re-established; it turned out to be a seven-year cycle. Interestingly it was the same for all trees measured, different ones relating to different planets. Here was hard scientific evidence for the traditional relationship between trees and planets!

Lawrence measured thousands of buds in the course of this investigation, which initially were picked in groups of ten from each tree and photographed, the lambda being taken as the average of the ten. We bought him a video camera and computer, which with suitable software made the task much easier and quicker. The results of all this work were firstly to confirm the existence of the rhythm as an objective fact, secondly to show that the phase shift had a seven year cycle, and thirdly to answer the question quite definitively as to which planet related to which tree. His faithfulness in pursuing the work every day when possible is reminiscent of the work of the Danish astronomer Tycho Brahe who likewise faithfully measured the courses of the planets over very many years, yielding a factual basis indispensable for the work of Kepler.

One tree, however, did not show the rhythm, and it turned out that it was very close to a large electrical distribution transformer. It would not be easy to confirm this scientifically by planting more trees near transformers! Instead he worked with knapweed and those growing under electrical cables also had a suppressed rhythm. In 1994 comet Shoemaker-Levy crashed into Jupiter, and as knapweed is related to Jupiter he took many extra measurements that year and found that its behaviour was quite different from the norm, a most significant discovery. The results seemed to show that the buds anticipated the collision, as their abnormal behaviour started well before it.



covery was a way of describing
ch are not path curves. He
' for this with remarkably
it to transform vortices into em-

any people to take up the work
that it will continue. A group
ose. His lectures and courses
er heard: warm, inspiring and
first lecture, on astronomy, at
ly age showed his genius for
ers. He also answered letters,

and helped many of us with his apposite replies full of insight.

He wrote up his results in two books: *The Field of Form* in 1982, and then *The Vortex of Life* in 1993. He also wrote *Projective Geometry*, and as a very young man a book on astronomy with a foreword by the then Astronomer Royal. In addition he wrote seven *Supplements and Sequels to The Vortex of Life* giving invaluable practical details and results of his research and that of collaborators.

Finally, perhaps it is worth mentioning that for the last decades of his life he lived and worked in Strontian in Scotland, where strontium was discovered, taking its name from the place. His spiritually-based research was perhaps an antidote to the kind of science associated with strontium 90 and radio-activity.

Nick Thomas

News – Comment

The Phenomenon of Coloured Shadows – letter to the editor

I was very grateful for your including in the September 2003 issue Malin Starrett's excellent article on coloured shadows and his research into what well respected scientists have added to this phenomenon's explanation in recent years. It may be that Malin Starrett had not seen my article on this topic in the previous issue (March 2003). One of my main contentions – which I still hold after perusing his article – was that *both* eyes need to be used when observing coloured shadows – one looking down the tube and the other wide open observing the focused colour *and* its surroundings. It is not for nothing that human beings have *two* eyes. One might remember Ernst Lehrs' book *Man or Matter* and his criticism of materialistic scientists who take a 'one-eyed, colour-blind view of things'.

Ron Jarman

Picture forming (imaging) methods development

Scientists at the University of Kassel, Germany, have developed methods to distinguish organic and conventional samples of wheat and carrots from field trials at the Research Institute of Organic Agriculture (FiBL) using imaging, spectral analytical and electrochemical methods. Amongst the methods is copper chloride crystallisation. Organic and conventional food products show different crystal patterns which are interpreted by software.

Taken from *The Genetic Engineering Newsletter* which is available on the Internet:

http://www.oeko.de/gennews_engl.htm or <http://zs-l.de/>.

You can order it for receipt by e-mail (mail to listserver at oeko.de, NO subject, text: subscribe gen-news-en at oeko.de).

Picture forming methods at the Swiss Academy of Science

Guy Desbiolles, Waldorf Science Teacher at Collège du Sud, in the town of Bulle (Fribourg) was interviewed last year for the National Research Programme of the Swiss Academy of

Science (NRP 47) on the subject *How to give high-school students a taste for chemistry*. His comments address the decline in interest in the so-called hard sciences amongst young people throughout Europe. The full text of the interview and his suggestions for a remedy can be read on the Academy's web site at http://www.swiss-science.org/_nfp47/html_e/nfp_frame.htm. On the same page is a link to a beautiful poster in Adobe Acrobat format entitled *Tempêtes dans un verre d'eau (Hurricane in a glass of water)* produced by his pupils on the subject of picture forming methods. Desbiolles' results with Lili Kolisko's method for studying Moon-Planet relations are at http://www.anth.org.uk/Science/Metal-Planet_Relationships_Index.htm.

How gravity can be overcome

The following item is a translation of the preface to an article in Der Europäer 8, Nos. 2/3, Dec 2003/Jan 2004, pp 32-35.

We thank Henry Goulden and Christoph Podak for bringing it to our attention.

Research on 'gravity' has occupied scientists since Newton. Gravitation in the sense of mass attraction soon became a dogma and the laws postulated for it have since become ir-refutable.

Even Einstein's space-time curvature theory did not alter the situation. Paradoxically, gravity has remained the least understood of the known 'physical forces'. Individual researchers have noticed more and more phenomena which contradict the accepted *credo* and render unconventional effects useable, for example so-called free energy production. Indeed, in 1992 the Russian materials scientist Evgeny Podkletnov succeeded in establishing generally credible proof of 'anti-gravitation'. However, organisations such as NASA put a lot of effort into reproducing his results, so far without success.

In the controversy which has flared up since, a matter not insignificant for the status of spiritual science has hitherto been overlooked, namely that – with a foresight similar to the case of mad cow disease – Rudolf Steiner had already in the 1920s indicated the possibility of using technology to influence gravity. After his studies at the Technical University in Vienna it became his pressing concern precisely to follow through the development of the 'mechanical theory of heat' and to overcome its one-sided viewpoint (cf. his foreword to the 1st edition of *Occult Science – An Outline*, GA13, 1909. Published by Rudolf Steiner Press, London as *An Outline of Esoteric Science*).

No less striking are the parallels between Ehrenfried Pfeiffer's ideas and Podkletnov's actual experimental design in which a 'superconductor' has an important bridging function. Pfeiffer's comments in this respect are based on a lecture given on 19 January 1952. The unrevised tape transcript was published under the title *Consciousness and Research Attitudes* in Notes and Lectures, Vol. 2. pp. 1-14, Spring Valley, 1991.

Christoph Podak (Tr. David Heaf)

Reviews

Projective Geometry. Lawrence Edwards. Floris Books, Edinburgh, 2003. 2nd Edition. ISBN 0 86315 393 3. 352pp. £20.00

The first edition of this book, subtitled *An Approach to the Secrets of Space from the Standpoint of Artistic and Imaginative Thought*, gave me hours, no weeks, of entertainment as I worked through all the exercises in it from cover to cover.

Perhaps I am already too enthusiastic about the book to review it critically. If you are new to projective geometry, and this book is accessible to the absolute beginner with little or no previous knowledge of mathematics, you soon realise that it takes one into parts of the mind that other thoughts cannot reach, into planes of imagination one never knew existed. The experience can be positively exhilarating. I recall the author once recounting in a lesson on projective geometry how as a small boy he asked the adults about infinity. He was told that if he started thinking about it he would go mad. The trouble was, so he recalled, once he had been told that, it became hard

Cover picture: path curves

to stop thinking about infinity! And in projective geometry, infinity is very much part of the picture, not only the infinitude without, but also the infinitude within. (More about Lawrence Edwards life can be found in his obituary written by Nick Thomas (page 1)).

Projective Geometry is very much a practical course in the subject. You must actually *do* it to understand it. It seems unlikely that a beginner could perform the exercises purely in the imagination without recourse to pencil, ruler and paper. And later in the book, where three dimensions are dealt with, it is helpful to make string models.

After an introduction, the subjects covered are: duality, including curves; collineation; cross ratio; correspondences; conics, including osculating conics; growth, circling and step measure; involution; polarity; the imaginary (conics, four point systems, circles, spheres); path curves; quadrics; twisted cubics; developables; linear congruence and the tetrahedron; perspective. Many of these terms may seem frightfully technical to the beginner, but it has often been found that people who do not think they have an aptitude for things mathematical find themselves quite at home doing practical projective geometry. It takes a little patience, a preparedness to contemplate a problem, sometimes coming back to it after having slept on it. I got stuck a couple of times and needed to ask Lawrence Edwards for help. It turned out that I had not been working methodically enough with the material in the exercise. However, it has to be said that there are a few excursions into algebraic notation, especially where the imaginary realm is entered, though these should not interfere with taking a purely visual, pencil-and-paper approach.

What is changed in the new edition? The 43 sections in the original have become 23 in the new edition with some renaming of sections and regrouping of sub-sections. The book has gained an index. I so much missed an index in the first edition that I created one as I worked through the book. (If you would like to receive a copy of this index by email please contact me at the address at the end of this newsletter.) The 'propositions of incidence' have been revised in terms of 'meet' and 'join' and the terminology throughout is correspondingly modified. A few new exercises have appeared. The exercise numbering, an easy to follow sequence from 1-73 in the original, seems less clear in the new edition, especially in section 6 where there appears to be an anomaly. Also, some passages which were numbered as exercises previously are now not so. Several of the diagrams which were not very well reproduced originally are now much clearer, especially where colour has been introduced to the more complex figures towards the end of the book. However, strangely, some figures have lost the clarity they had formerly, for example on p. 179 in the new edition.

The Apollonian circles on the cover of the first edition have moved into the book in the second edition, the cover of which now bears a selection of path curves, the geometric forms which are so central to the biological applications of Lawrence

Edwards' work (see *The Vortex of Life*, Floris Books, Edinburg, 1993. ISBN 0 86315 148 5. Currently out of print but the publishers inform me that a new edition is being contemplated.)

For this gem of a book continuing to be made available, a warm thanks are due to Lou de Boer: he scanned in the text and diagrams from the earlier edition; Denis Wight for checking proofs and exercises, and last but not least the publisher, Floris Books.

David Heaf

Does Waldorf offer a Viable Form of Science Education?

A Review

Unbiased and independent observers, both in the USA and in the UK, often notice that Waldorf school pupils seem to enjoy science lessons rather a lot; that the Waldorf system of 'Main lessons' (taking the same subject every morning for a whole month or so) does not seem to work against comprehension and participation; and that Waldorf pupils can indeed proceed to careers in science if they choose.

But there is a nagging doubt. Researchers with a scientific training are aware that lurking somewhere in the background, behind the particular methods of Waldorf school practice, may lie the anthroposophical teaching of the schools' founder, Rudolf Steiner. They are concerned that a kind of 'pseudoscience' i.e., various kinds of rather fantastic notions derived from the branches of anthroposophy which relate to science, might creep into the teaching practice in the schools; and (to exaggerate) that pupils might go home full of notions of the 'Old Moon', rather than more conventionally derived notions of animal evolution or cosmology etc.

These very interesting concerns, and others, have been articulated by David Jelinek and Li-Ling Sun of Sacramento University in California in a monograph available from djelinek at csus.edu or from the College of Education of the University, 6000 J Street, Sacramento, California CA95819.

Anyone who has worked in both the Waldorf and state systems (at least in the UK) cannot help being intensely fascinated by this monograph, and sympathetic toward its aspiration. Within its pages, two worlds collide; two worlds which *in principle* should be able to find common ground. But *in practice* come upon many obstacles and objections.

Here on the one hand is the world of the scientist. Here are pages of tables, statistics, graphs and samples. Here is the milieu of the utterly dispassionate objective scientist, attempting to judge a phenomenon completely without bias or partiality. 'Waldorf education science' is 'tested' in the way characteristic (supposedly) of the pure observer who only desires to know the truth.

There, on the other hand, is the world of the Waldorf school, and in particular Waldorf School Science; beginning in a preliminary way with 9 or 10 year olds 'building houses' and advancing to atomic science in class 12 (maybe). A world in which the keywords are *interest*, involvement and participation.

It is immensely instructive to think through the difficulties which must arise when one tries to bring these worlds together not only in *theory* but in fact, with actual human beings; and for that reason this monograph can be recommended both to Waldorf science faculties and departments; and to mainstream ones.

As scientists, or educators in science, we are, after all, inheritors of a tradition and culture whose achievements rest on the capacity to remain uninvolved and impersonal; to think with the coolness we are accustomed to in a statistical graph. As a science teacher, one can feel how morally valuable such an attitude can be, when one watches a maybe excitable and

nervous child make a reading on a thermometer with a couple of seconds of quiet attention. But on the other hand, one feels how painful and appalling it is to see education and the welfare of children reduced to statistics, league tables and percentage points, 'value added scores' and all the rest, and the destructive effect upon the actual educational process involved in this. For above all, an education is a *relationship* between a teacher and his or her pupils, and everyone knows that relationships are intangible, immeasurable entities, and in a sense invisible.

On the other hand, one knows as a Waldorf School teacher, the importance of this relationship between class and teacher. If anything distinguishes Steiner schools from perhaps any other system of education it is the teacher-centred approach. An enormous amount is demanded of the individual teacher; the class teacher struggling to cope with basic physics one moment and class 5 painting the next followed by German in class 8; or the class 10 science specialist who constantly hears the injunction in his mind 'to interest the pupils'. This, as the authors discover, leads to Waldorf schools becoming something of a set of islands of a tradition stretching back to the 1920s or 30s. Content introduced by noted anthroposophical authors is still heavily relied on. And inevitably it produces risks that the Steiner school science curriculum might become quaint or 'time-warped'.

Summarising, the authors *do* find evidence of this danger, and consider it more serious than the other problems mentioned; that the Steiner schools methods are inappropriate; or that anthroposophy is being taught to pupils. Broadly, they find that the methods (unsurprisingly enough) depend on the practitioner, and what sort of relationship and subject-command the teacher possesses. This, as one knows, can vary enormously, and not only in Waldorf schools.

They do not find much evidence of anthroposophy being covertly taught, at least in America; so it is unlikely that pupils will come home talking about main lessons in angelic hierarchies! (However, I think it is worth noting, at least in Britain, that quite a lot of oriental notions and practices are making their presence felt in schools, many of which are based on the most amazing pseudo-science; ideas garbled and cobbled together from Yoga, Tai chi, acupuncture and the rest, and pedalled by 'experts' for money).

The authors are critical of some of the books available for Waldorf teachers of science. They are especially hard on Roy Wilkinson's books, finding that they use assumptions based on anthroposophy in the teaching content; but they praise Brien Masters' approach and others.

It is really interesting to watch the process of scientific enquiry at work in this monograph. For example, we have the statement:-

'As a first step, Waldorf should disregard Rudolf Steiner and Anthroposophy as the source of accurate scientific concepts.'

Later on the same page:-

'There is also an argument that Anthroposophy and Waldorf education are inseparable'.

In a way, how true both these statements are! How demanding is the task of the science teacher, whether in the Waldorf or regular system, to bring one's whole personality into action in an area of knowledge which otherwise can shrink away into something cold and lifeless; and in which the temptation is to gain a facile spurious participation by means of technical wizardry and fascination; and to appeal to pupils purely on the basis of self-interest and examination passes (in either of which true science withers away).

So after struggling with the text so helpfully compiled by the authors, one is left with the feeling of how essential it is to

observe and think in science with complete impartiality and objectivity and at the same time to be engaged with one's whole humanity in the process of discovery.

In their final section, the authors present what they consider the five key ideas not adequately covered in Waldorf science teaching, at least in their experience; ideas which they perhaps feel have been rejected or neglected by Steiner schools.

These are:-

1. The atom
2. The periodic table
3. The Big Bang
4. Plate tectonics
5. Evolution

One might feel that this list reflects the authors' perspectives more than anything else; but despite this, in *principle* one can see how important it is to keep abreast of developments in science and come, (as a teacher) to one's own understanding of them; and if one happened to be an anthroposophist and is honest with oneself, this will in every case involve a kind of inner turmoil, an alchemical process of fixing, fusing and refining; and this is only preliminary to the second process of sharing this with a class of pupils whose immediate interests lie far distant!

The last word can be with the authors:

'Ultimately, our care for encouraging the effort comes anecdotally and is about the students. Time and again, as our researchers visited the many Waldorf schools across America, we were impressed with the eager confident and curious Waldorf students we encountered. Those students demonstrated original thinking and innovative problem solving, leaving us with the impression that they cared about what they were doing, were intrigued by challenging situations and penetrated matters with thoughtful and creative insights. One can only imagine how far they could go with sound scientific ideas as part of their repertoire. We think it is worth finding out.'

Stephen Moore-Bridger

Flowforms – The Rhythmic Power of Water. A. John Wilkes. Floris Books, 2003. p/b. ISBN 0 86315 392 5. 240pp. £16.99

Flowforms traces the 'biography of an idea' from its origins in mathematics and applied science, to experimental technology and ultimately to an invention which not only has many practical uses but also brings beauty and atmosphere to the built and landscaped environment. It is a wonderful example of what can arise from the marriage of science and art, and above all the deployment of moral and aesthetic modes of creativity.

The author, John Wilkes, long a member of Science Group, trained as a sculptor and went on to teach and do sculpture – particularly in relation to morphology and metamorphosis – at Emerson College in England, the Goetheanum in Switzerland and the Rudolf Steiner Seminar in Sweden. In 1961 he worked with George Adams at the Institute of Flow Sciences, Herrschried, Germany (founded in collaboration with Theodor Schwenk), making apparatus, in particular 'path curve' surfaces which were originally described by Felix Klein and Sophus Lee in the 19th century and regarded by Adams as fundamental to living forms.¹ Wilkes identifies his main discovery as 'the possibility to generate rhythms in streaming water by means of a specific level of resistance'. Helped by sketches from the researcher's notebooks the reader is taken from the birth of the idea in the laboratory to its adulthood cast in concrete.

The readership is intended to comprise anyone with an open-minded interest in the environment on its own terms. A key

premise of the book is the recognition that for the environment, the 'situation is serious and humanity still needs the earth and its manifold species for some time to come in order to carry out tasks it has not yet fulfilled'. Flowforms could contribute to resolving the environmental crisis by healing polluted water and water damaged by technological uses such as hydroelectric schemes.

Richly illustrated throughout, the book covers water and rhythmic flow, metamorphosis, the discovery of flowforms, flowforms in living nature and many different applications round the world including in the fields of sewage treatment, slurry vitalisation and biodynamic food production. Four appendices totalling 60 pages go into greater depth on metamorphosis, flowform design, projective geometry and the activities of the Virbela Rhythm Research Institute.² There is enough material in the book to satisfy both technical and non-technical backgrounds, although the lay reader might struggle in places. For example, the term 'counterspace' crops up occasionally but without adequate explanation of its meaning. Also it is assumed that the readership knows what 'biodynamic' means. As the book is intended for a broad readership a glossary would be a help.

One thing that struck me after reading the introductory passages was the lack of mention of the fact that the application of projective geometry by George Adams, the flow researches at Herrischried and the bringing together of these activities have arisen from indications by Rudolf Steiner. Indeed, the whole embeddedness of the technology in the networking and collaborations of people within the anthroposophical movement does not come to the fore. Rudolf Steiner is mentioned, but this happens relatively late in the book and in specific sub-contexts.

Although path curve geometry appeared at an early stage in the genesis of the flowform idea, once it was born and developed, mathematics does not appear to have figured conspicuously. Indeed, turning to the five pages devoted to path curves in an appendix it is not clear how understanding path curves was a necessary precondition for the idea. The approach throughout the development of the idea into flowform cascades, its main application, appears to have been trial and error, with no apparent theoretical input from either flow science or mathematics. In obtaining the pulsation and lemniscatory movements, which characterises such flows, the motto was 'the not too much, and the not too little'. And one need hardly be surprised at this empirical approach. Mathematical modelling of a flowform cascade would no doubt be a horrendously difficult task, as rhythms arise not only in the individual dishes but also with longer periodicities over the cascade as a whole. In a section on the metamorphic sequence of flowforms we read: 'The function of such a complex unit is to offer water a manifold and rich spectrum of treatment through an ordered metamorphic quality of exposure approaching to some degree the fertile complexity of nature's own living realm.' Later in the book, mathematically derived flow devices do get a mention but they are still experimental.

I looked in vain for evidence of the technology interfacing with the well developed science of fluid dynamics. And the comment that 'in the early 1970s, scientific circles seemed to show very little understanding, or even interest, regarding the influence of rhythms' (p. 133) surprised me because the science of chronobiology, with all its varied and complex periodicities, was at that time already well advanced. What efforts were taken by the flowformers to engage with 'scientific circles'?

In an appendix Nick Thomas discusses scientific and technical aspects. Although the basic flowform was not developed

theoretically, subsequent statistical study of rhythms and dimensions of existing forms suggested that mathematical modelling may offer some scope. Indeed, there appears to be a linear correlation of the length of the long axis of a flowform with a function of its shape, but the regression line presented is constructed between two distinct clusters of points corresponding to existing forms which taken separately would not be nearly so well correlated. In recognition that the biological benefit of a flowform may depend on its rhythm, work is in progress to monitor frequencies.

One of the striking findings of flow research is that so many flow patterns in inorganic nature reappear in almost identical form in organic nature. Instances are jellyfish, fungi, seaweed and other plant forms, vertebral columns, primitive hearts and embryos. Many aspects of Goethean science are developed: cognition of the unifying movement principle among changing forms; the archetypal plant and polarity. The section on flow experiments that can be done at home promises hours of engrossing entertainment.

1. For more on path curves see Nick Thomas' web site at <http://www.anth.org.uk/nct>

2. See <http://www.anth.org.uk/virbelaflowforms/>

David Heaf

The Flexible Giant – Seeing the Elephant Whole. No. 2 in 'Nature Institute Perspectives' series. Craig Holdrege. Nature Institute, New York, 2003. ISBN 0 9744906 0 1. 65pp. \$10.00 www.natureinstitute.org.

I have enjoyed reading Holdrege's insightful phenomenological essays that have appeared for a number of years now in *In Context*, the newsletter of the Nature Institute. This is a longer essay based on osteology, observation of captive and wild elephants and the wealth of observations by others, presenting a study of the beast intended to bring its unique characteristics to clear expression. The methodology is stated at the outset, the parts will not yield the whole but can be related to the whole. Explanations of the form, least of all those from preconceived ideas of causation, just don't work. Imagination is the key, i.e., 'achieving saturated inner images of the elephant's characteristics'. The author keeps to Goethean methodology of portraying rather than explaining, not giving way to the tyranny of the idea. As the title indicates, flexibility is perceived as the leitmotif of the elephant shown most obviously in its trunk, but also clearly apparent in its nutritional adaptability, dentition and range of habitats. The short head evidences the principle of compensation or correlation of parts. The comparative method is illustrated in the evidence presented for the striking similarities with the human being: life span; long adolescence; need to acquire so much through learning; flexible prehensile limb; leg anatomy; position of mammary gland; skull shape and shortness; head unable to reach ground. The elephant can move with great destructiveness, for instance when pushing trees over, or with extreme delicacy, as when it uses a twig to dislodge a tick from between its forelegs. Finally, the intelligence, for which the elephant is renowned, is 'carried out and made possible by the *whole* animal. And in the elephant this whole is most vividly displayed in the use of the trunk.' (p.55)

David Heaf

Rudolf Steiner's Philosophy and the Crisis of Contemporary Thought. Andrew Welburn. Floris Books, Edinburgh, 2004. 288pp. ISBN 0 86315 436 0. £25.00. US\$45.00.

'The loss of the human self as agent, as the true source of 'spiritual activity,' in the mainstream of modern philosophy leads into these shadowy wastes of post-modernism, post structuralism and the like.' (p. 135)

Andrew Welburn is a fellow of New College, Oxford, where he lectures in English. He has made a special study of Shelley's poetry and of the relations between imaginative literature and the esoteric tradition. As well as books published by Macmillan on the Romantic tradition, he has published several with Floris Books on esoteric Christianity and Gnosticism. He has also run study groups on anthroposophy for students at Oxford and Cambridge. Although his speciality has little to do with the natural sciences, he seems at home when discussing philosophical and ethical problems thrown up by contemporary science (biology, physics, sociology, psychology, anthropology) and a review of his book in this newsletter is therefore justified. It attempts neither to rewrite Steiner nor to give a technical account of his philosophical achievements or a detailed guide to his texts. Rather it is a collection of observations on the continuing relevance of his thought to issues that seem crucial today.

As it is now 110 years since Rudolf Steiner's *The Philosophy of Freedom* was first published, and oceans of philosophical water have flowed under the bridge since, it would be useful to have a new edition of the book set in the context of contemporary philosophy. Until that happens, Welburn's contribution provides an excellent alternative. Drawing from not only Steiner's epistemological works including the one already mentioned, but also from his comments relevant to philosophy in the published lectures, Welburn covers the whole breadth of Steiner's philosophical thinking and in doing so relates it to contemporary philosophy and ethics, including the work of several philosophers alive today. Streams in philosophy visited in the book include neo-Kantianism, phenomenology, structuralism and post-modernism. The reader is warned not to overestimate the originality in Steiner's thought. Elements belong also to his predecessors and contemporaries, and Welburn points to striking similarities that are emerging in contemporary philosophy. But they are rarely as radical as Steiner. Of one thinker discussed at some length Welburn observes: '[Roger] Penrose comes to the very verge of Steiner's "spiritual activity" only to fall back, it seems, at the final hurdle. This reviewer is not qualified to comment upon the correctness of Welburn's interpretations of the work of the many philosophers discussed, but he certainly has no difficulty in recognising Steiner's thinking as presented in the book.

With respect to the subtitle, there is nowhere in the book a specific chapter or sub-section heading which focuses on the 'crisis in contemporary thought'. One can read the whole book through and wonder which philosophical problem represents the actual crisis. However, while problems in modern thinking are visited throughout the book, one could justifiably identify – for example in Chapter 2 on *Knowledge as Relationship* – the overarching problem of contemporary thought as materialism. Here Welburn contrasts Steiner's acceptance of 'things in their own right, with intrinsic value, beyond their personal significance...' and materialism's denial of that recognition, seeing the world as something to be manipulated, controlled, dominated and disposed of. Awareness of spirit, seeing as God sees (Goethe), enables recognition of otherness, value on its own terms, and confrontation with the responsibilities resulting from such a broader vision. 'Love is the greatest power of human knowledge' (p. 114). Contrary to repeated assertions in the media by Lewis Wolpert and other representatives of establishment science, 'there is simply no value-free knowledge'. Once science is freed from its spurious metaphysical baggage its knowledge is always from a certain viewpoint, a particular context, purpose or aim. And awareness – knowledge – is a prerequisite for moral action. Furthermore, by admitting the spirit dimension to science there is no danger of a return to a

kind of pre-Galileo past provided that there is no requirement in spiritual science to make a prior act of belief. Steiner strives to clear away any hindrance in thinking for the modern person who wants to see for him or herself.

I have heard my contemporaries complain that Steiner's philosophical/ethical approach is too individualistic. For example, as Welburn reminds us, there can be no normative science of ethics: 'We neither have nor need any standards beyond that of our self as it becomes free to tell us what to do'. Individualistic indeed, yet 'the goal is to engage with forms of thinking which develop in living complexity in society as a whole' (p. 18). Part of the technique is to notice the 'complicity of thinking' or, as Steiner put it, the 'unobserved element' in experience. When we do this we notice that science tries to reduce human beings to nature, thus overlooking the fact that we ourselves produce the knowledge. It is now recognised in quantum physics that the observer (knower) cannot be left out of the knowing process. Indeed, Welburn sees the 'anthropic principle' at work in the knowledge process. Since the world shaped us, our nature and organisation open the way to the nature of the universe.

Modern polarisations in thought, such as the Kantian categorical imperative versus the utilitarianism of Bentham, are resolvable once the thinker acknowledges his responsibility in the act of creating them, the key being the unfamiliar standpoint or perspective chosen by the 'riddler' (philosopher). And standpoints evolve with changing consciousness through the history of thought. Welburn argues that modern science has overlooked the part played by the evolution of consciousness in its own genesis, but (quoting Steiner) 'it is an evolution of the self that is experienced in building up our scientific knowledge of nature'. Evolution here is not a passive process. Steiner, taking seriously a monistic theory of evolution, sees man creative in the cosmic process and his knowledge the most highly evolved part of it. Here Welburn briefly shows the importance of human morphology and the upright posture.

I was favourably impressed by how naturally the author leads the reader, almost unawares, over the boundary from philosophy to anthroposophy and the occult. One gets a real feeling for how necessary to knowledge and its world-shaping power are concepts from spiritual science such as ahrimanic, luciferic, the Archangel Michaël, the Logos and modern conceptions of reincarnation and karma. For example the *mythos* of the luciferic and ahrimanic surfaces in the balancing of the assimilative and accommodative modes of cognition. Natural science is of course no stranger to the occult or supersensible: the concepts of quantum physics cannot be pictured in sensorial terms. But Welburn acknowledges, albeit late in the book (p. 191), that Steiner's philosophy can neither predict nor prove his anthroposophy and neither can the latter underpin his philosophy.

As regards technical aspects of the book: for me it got off to a slow and somewhat repetitive start in the first couple of chapters. I excuse this on the grounds that many readers would be coming to the thought content for the first time. It is very well written though there seemed to be a few copy editing oversights that caused me to stumble. Did Goethe's metamorphosis get 'sidetracked' by the materialistic version of evolution or was it 'sidelined', as seems more likely?

Has Welburn found anything unhelpful in Steiner's thinking? Well, not exactly, but he does say at the beginning of a 17-page appendix that 'one of the undoubted drawbacks to *The Philosophy of Freedom* for a modern reader, is the excessive amount of attention it devotes to disentangling the ideas of the neo-Kantians'. I can concur insofar as when I led a study of the book some young students questioned the relevance of this

part. However, I have always regarded it as a useful mental limbering-up for what comes later, an exercise in concise, clear thinking. But, in conclusion, I come back to my earlier comment: is it time to rewrite the book for a modern context? If so, who would be up to this task?

David Heaf

Future Meetings

Imaginative Participation in Science – A conference of the Science Group of the Anthroposophical Society in Great Britain

Friday 1st to Saturday 2nd October 2004 at Wynstones School, Whaddon Green, Gloucester, GL4 0UF.

Fuller details of the programme will appear in the September issue of this newsletter. Organiser: Derek Forman.

Contributors: *Derek Forman* would like to build his theme around 3 books: 1. *Matter and Mind* by Edelglass, Maier, Gebert and Davy (subtitled: *Imaginative Participation in Science* and now published by Lindisfarne Books under the main title *The Marriage of Sense and Thought, 1997*) 2. *Man or Matter* by Ernst Lehrs. 3. *Gaia-Sophia* by Kees Zoeteman. The latter is chosen mainly for references about time. Materialist scientists claim that the microcosm is explained by quantum mechanics and the macrocosm by general relativity, neither of which are consistent with 'common sense'. Now attempts have been made to reconcile these ideas with 'string theory'. Are all these concepts 'Ahrimanic errors' or 'partial truths'?

Henry Goulden – Beiträge No. 122, Rudolf Steiner Verlag. *Nick Thomas* – space and counterspace and its relation to quantum physics. *Michael Freidjung* – subject to be announced. *Ron Jarman* – cubic curves and the unfolding of plant life.

Registration 4 to 6 p.m. Friday 1st October. Conference registration fee: £20

For enquiries/bookings regarding meals and accommodation contact Graham Kennish, Tel: +44 (0)1452 812537. Email: graham at grahamk.demon.co.uk. Please book as soon as possible. Booking deadline: 3rd September. All meals/refreshments approximately £20 from tea on Friday to tea on Saturday (an additional evening meal on Saturday is negotiable for those who have to travel a long distance). Bed and breakfast approximately £20 per night.

The conference will take place in 'Windrush', the Upper School science block comprising one lab and one class room with a large lobby (for refreshments) and the use of the kitchen.

The conference is open to all. The speaker list is not yet closed. If anyone would like to make a contribution relating to the above theme, please contact Derek Forman, Tel: +44 (0)1435 8731278. e-mail dforman1928 at hotmail.com. Melford House, Fir Toll Road, Mayfield, TN20 6NB, UK.

Earthly and Heavenly Harmonies

Thursday 7th to Sunday 10th October 2004. Hawkwood College, Stroud, Glos.

Contributors: *Wolfgang Held*, astronomer at the Goetheanum – two lectures: 1) The significance of Mars in fostering a new impulse for peace. 2) How shall we understand that the Moon could be a dwelling-place for angels? – a scientist's approach. *John Meeks*, science teacher – two lectures: 1) From mythology to astronomy. 2) Star mythology and the science of the soul.

Fritz Wefelmeyer, Sunderland University – two lectures on Hegel and his relevance to scientific thinking: 1) From today's reception back to Bacon & Böhme. 2) From Rosicrucian phi-

losophy to today's quest for methodology. *Thomas Meyer*, author of '*D. N. Dunlop: A man of Our Time*' – lecture and forum on Ehrenfried Pfeiffer, pioneer of the biodynamic movement, scientist and friend of Rudolf Steiner. *Desmond Cumberland* – lemniscatory planetary movements; the Lemniscate Planetarium of Albrecht Hemming. *Henry Goulden* – anthroposophical scientific research since 1919; 'The P. E. Schiller File'. *Malin Starrett* – on his recent phenomenological research in physics.

Maggie Macdonald Salter – painting; lecture on the first and second Goetheanum buildings, illustrated with slides. *John Salter* – clay modelling. Exhibition: *John Salter* – Sculptural forms of the constellations of the Zodiac. Recital (Friday 8 p.m.): Almira String Quartet – Prokofiev, Hugo Wolf, Beethoven. Programme subject to alteration without notice.

For further information contact Henry Goulden, Tel: +44 (0)1840 212728. The Chapel, Treligga, Delabole, Cornwall PL33 9EE.

Fees: Individual lectures including refreshments £6. Non resident (conference & meals) £180. Resident (shared room) £218. Resident (single room) £248.

Booking enquiries: Hawkwood College, Painswick Old Road, Stroud, Glos, GL6 7QW. Tel: +44 (0)1453 759034. Fax: +44 (0)1453 764607. Email: bookings at hawkwoodcollege.co.uk. www.hawkwoodcollege.co.uk (online booking possible).

UK Group of the Science Section

There will be meetings of the UK group of the Science Section on Saturday 30th October 2004 at Elmfield School, Stourbridge and Friday 18th February 2005 at Strontian, Argyll, Scotland for members of the School of Spiritual Science who are taking responsibility for the scientific work. The 18th February meeting has been scheduled immediately to precede a 4-day conference on the bud work (see below).

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.fslife.co.uk.

Living Forms Research

The Strontian long weekend conference planned for last October, following the successful one held a year earlier on bud research, had to be postponed. It has now been decided to hold this round the weekend of Friday evening 18 February to Tuesday morning 22 February 2005.

The fund available to help new researchers to buy equipment and to defray some of the expenses of participants at next year's conference will be available via the conference organiser: Denis Wight, 43 Thomson Rd., Currie, Midlothian, EH14 5HT. Tel: +44 (0)131 449 3115. Email: deniswight at onetel.net.uk.

Anyone who wishes to make contributions on the bud work, path curves and their application in various realms – medical, astronomical etc. – should get in touch with Denis Wight.

At the opening of the conference we will devote time to remembering Lawrence Edwards, who died on 3rd January 2004, and his life and work, culminating in the publication (by Floris Books) of his *Vortex of Life* and subsequent results.

We hope to welcome both new and old friends in Strontian. Denis will be circulating more information about the conference in the weeks and months ahead.

Ifgene – International Forum for Genetic Engineering

The planning of the *Ifgene* conference scheduled for 2004 in Paris had to be abandoned. Not only did we experience some disagreement with a potential partner and venue provider, UNESCO, about the form of the conference, but also our co-

ordinator in Paris was unable to get dispensation from her employer to include the preparation in her normal work schedule. However, it is our intention that the conference concept, domestication of plants and animals and the evolution of human consciousness – partly inspired by the work of Jacques Cauvin – should not be discarded. It is likely that it will form part of a Science Section conference on evolution at the Goetheanum, Dornach, Switzerland, in 2005.

Meanwhile, *Ifgene* Netherlands has begun another conference initiative. It will probably take place in March 2005 somewhere in the Netherlands. The concept text is not yet ready for publication, but the theme is essentially concerned with coexistence between agricultural systems with and without genetic engineering. Both organic and biotechnological agriculture claim that they are developing sustainable agriculture. This raises issues wider than the normal interpretation of coexistence concerned with cross contamination or identity preservation. These issues involve attitudes to the world and living nature, the moral dimension of knowledge as well as relationships and rights of human beings.

More details will be included in the September issue of the newsletter. Information about *Ifgene* can be found at <http://www.anth.org/ifgene/> or requested from David Heaf, *Ifgene* UK co-ordinator, Hafan, Cae Llwyd, Llanystumdwy, LL52 0SG, UK. Tel/Fax: +44 (0)1766 523181. Email: 101622.2773 at compuserve.com

Publications

In Context, The Newsletter of the Nature Institute

No. 9, Spring 2003: As well as short items of news, reviews and comment, the publication carries the following two feature articles: How does a mole view the world?, *Craig Holdrege*; To explain or portray, *Steve Talbott*.

No. 10, Fall 2003: Feature articles: The giraffe's short neck, *Craig Holdrege*. Qualities, *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 at natureinstitute.org. Web: www.natureinstitute.org.

The Nature Institute's online *NetFuture* newsletter is available at www.netfuture.org.

Elemente der Naturwissenschaft

No. 79 (2) 2003. Mistelbeerenform und Tierkreis, *Stephan Baumgartner, Heidi Fluckiger & Hartmut Ramm* (an English translation of this paper is scheduled for publication in *Archetype* 2004). Zufall und Freiheit im Kontext der Naturwissenschaften. Teil II: Explorative Experimentieren, ideales Experimentieren und konditionaler Determinismus, *Renatus Ziegler*. Der Nadelbaumtypus – Schritte zu einem imaginativen Baumverständnis, *Jan Albert Rispens*. Hahnenfußgewächse im Jahreslauf, *Jurgen Momsen*. A concentration matrix procedure for determining optimal combinations of concentrations in biocrystallization, *Jens-Otto Andersen, Machteld Huber, Johannes Kahl, Nicolaas Busscher & Angelika Meier-Ploeger*. Zum Typusbegriff in der Botanik, *Ruth Richter & Wolfgang Schad*. Fake, Fraudulent, Random or What? *Diederik Ruarus*. Steigbildversuche nach Lili Kolisko, *Dirk Rohde* (part of this paper is in preparation for publication in English on Science Group's web site). Kann anthroposophisch von 'Schwerkraft' geredet werden? *Michael Kalisch*.

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

Subscription enquiries to: Goetheanum, Abo-Service, Postfach, CH-4143 Dornach 1, abo at 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, Tel. +41 61 7064210. Fax +41 61 7064215. 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 all back issues is available at <http://www.anth.org.uk/Science/elemindx.htm>.

Mathematisch-Physikalisch Korrespondenz

No. 214/215, Winter 2003 Photon – Elektron – Positron: Einige projektive Grundlagen der Quantenelektrodynamik, *Peter Gschwind*. Subscriptions are Sfr45/€25 per year. Edited by Dr. Peter Gschwind, Mathematisch-Physikalisches Institut, Benedikt Hugiweg 18, CH-4143 Dornach, Switzerland. Email: p.p.gschwind at intergga.ch.

Wasserzeichen

Nr. 19 (2003): Feature articles: Mit Wasser experimentieren (illustrated), *Andreas Wilkens*. Die gesundheitliche Bedeutung von Trinkwasserhärte, *František Kač íšek*. 'Der Quellkultus in der Schweiz', (compilation from the book by Heinrich Runge), *Yveta Kač íšková*. In addition to the articles in this in-house magazine, its 58 pages have many shorter contributions including items on the Flow Research Institute's work, conferences (e.g. The 3rd World Water Forum, Kyoto, March 2003) and publications. Price €2.00 per issue. Free to sponsors.

Institut für Strömungswissenschaften, Stutzhofweg 11, D-79737 Herrschried, Germany, Tel: +49 (0)77 64 9333 0, Fax +49 (0)77 64 9333 22. Email: sekretariat at stroemungsinstitut.de.

Internet: www.stroemungsinstitut.de.

Membership

We welcome as new members to the group, Philip David and Nicky Grace Gregory. The Group has 69 subscribers. The membership subscription is £5 (UK), £6 (Europe) or £7 (elsewhere).

Treasurer's report

In the 2003 accounting year, the income was £936.08 and expenditure £275.71. The closing balance was £2,089.68. Income was unusually high in 2003 because, as announced last March, £400.00 was received as a legacy from the estate of Hedley Gange. During the coming year we expect to use some of our 'conference reserve' on two of the conference initiatives announced in this newsletter.

David Heaf

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 2004.

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.

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