

Science Group of the Anthroposophical Society in Great Britain

Newsletter - March 2003

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Letter to Members

To members of the Science Group of the Anthroposophical Society in Great Britain and others who may be interested

In recent years interest in possible attendance at Science Group meetings has waned and those of us who are members of the First Class of the School for the Science of the Spirit want to re-enliven interest in meeting together as the wider Science Group in which the present tendencies in modern biology, botany, chemistry, physics, astronomy, agricultural science, etc can be talked about and evaluated. These subjects often contain materialistic viewpoints which a more alive spiritual but no less exact and rigorous science can challenge.

As a science group we could again meet as members and invite interested and sympathetic friends. We could also look at the question of how modern science is best taught in our schools in the 21st century.

The next meeting of our Science Section for members of the School of Spiritual Science, in either Stourbridge or Stroud, is planned for Saturday November 8th. We would be very grateful to receive well before this date any suggestions you would care to make regarding the content and way of conducting revived Science Group meetings; also suggestions for venues, dates, frequency (once or twice a year?) and length of such gatherings (one day or longer). Above all, such events, the first hopefully being in 2004, would need organising: who would like to volunteer?

There is much evidence in the world of mistrust in 'science', but this is only because of its having become one-sided in its approaches to the world of Nature and the ideals it is purporting to serve. An active, well supported Science Group, even if less than 30 people (we hope it would be more) could help bring about much needed change, both in ourselves and those around us.

Some questions already contributed include:

- How far does the present scientific research in the anthroposophical movement fit into general anthroposophical research?
- Science has become unpopular – how can we improve the situation?
- What contribution can we make to morality in science and the development of society?
- What can we do to stimulate interest in anthroposophical science work?
- How can the anthroposophical approach to science contribute to a new and emerging holistic science?

- Who are our partners? (in the light of people dropping out of the Scientific and Medical Network)

Simon Charter, Henry Goulden, David Heaf, Ron Jarman, Richard Swann and Nick Thomas.

Replies to Section contact Richard Swann, Orchard Leigh Camphill Community, Bath Road, Eastington, Stonehouse, Gloucestershire GL10 3AY. Tel: 01453 825617; Fax 01453 823811. E-mail: raswann@lineone.net.

News

Challenging the validity of Lili Kolisko's capillary dynamolysis method

Application and study of the capillary dynamolysis (*Steigbild*) technique developed by Lili Kolisko based on indications by Rudolf Steiner and involving metal salt solutions spreading through filter paper has led to questions about its reproducibility. The earlier work of William Steffen¹ on this and the correspondence arising from it was included in a review of capillary dynamolysis a few years ago². A recent paper by Václav Závěsky in *Elemente der Naturwissenschaft* adds a further challenge to the validity of the method³. The author's abstract best summarises his findings:

From capillary dynamolysis experiments with metal salt solutions, Lili Kolisko presented proof in several of her publications of the effect of planetary forces. Our difficulties with repeating these experiments prompted us to examine the experimental conditions. We focused our attention primarily on the aqueous composition of silver nitrate and iron(II) sulphate with or without additives, as these salts were used by Lili Kolisko to obtain her impressive series of capillary dynamolysis pictures. The patterns on the filter paper are formed by silver precipitates. The latter arise during the chemical reaction between silver nitrate and iron(II) sulphate. We observed that the patterns in the pictures, whose variations had been attributed to the effect of cosmic forces, are influenced by many physical and chemical factors. This is connected with the complexity of the reaction which is catalytic, photochemical and colloidal in nature. This makes it extremely sensitive and the experiments on filter paper can neither be standardised nor performed with controls. Such unmanageable experimental conditions bring into question whether they are suitable as proof, because the cosmic influences under investigation are indistinguishable from the terrestrial.

Only very rarely do the editors of *Elemente der Naturwissenschaft* preface the journal with their own comments on the articles. They have done so on this occasion and most of their preface is devoted to Závěsky's thirty-eight page article. Haijo Knijpenga writes on behalf of the editorial team (*Tr. DJH*):

In publishing this contribution it is not the intention of the editors to belittle the significance of Lili Kolisko's investigations. The results of her research which concern the proof of the effect of planetary forces with the capillary dynamolysis procedure with metal salt solutions are to be judged in the context Lili Kolisko, the person, and her time. Rather we would like, with Václav Závěsky's contribution, to enliven the discussion about the specific sensitivity of complex experimental conditions which occur in the pic-

ture-forming methods. Analysing results alone is not sufficient for clarification of this issue. As Závěsky shows, it is necessary to investigate the method itself. For a validation of picture-forming methods, determining their possibilities and limitations is absolutely essential to such investigations.

1. Steffen, William (1983) The physico-chemical basis of capillary dynamolysis. *Science Forum* 4, 3-7.
 2. Heaf, David J. (2000) Capillary dynamolysis. *Archetype* 6, 46-55.
 3. Závěsky, Václav (2002) Steigbilder mit Metallsalzlösungen nach Lili Kolisko – Ein Erfahrungsbericht mit Untersuchungen der experimentellen Bedingungen. *Elemente der Naturwissenschaft* 77(2), 16-54.
- Thanks to Henry Goulden for suggesting Václav Závěsky's contribution for special mention.*

David Heaf

BSE and uric acid

(We first drew attention to this project in the September 2001 issue – Ed.)

A report is presented of research on bovine spongiform encephalopathy (BSE) from the University of Bath, UK. In 1923 Rudolf Steiner mentioned that a condition similar to BSE (or 'mad cow' disease) could arise in oxen if they were fed meat rather than grass¹. A number of anthroposophists commented on the similarity between this scenario and the way by which BSE is supposed to have spread, through the feeding of meat and bone-meal supplement to cows. Steiner said that the 'madness' in bovines would arise from the accumulation of uric acid in their brains, while BSE is apparently caused by the accumulation of an abnormal conformation of a normal cellular protein. I have investigated if there is also a rise in uric acid in BSE cow brains.

My work and that of David Brown suggests that BSE is a complex disease. The neurodegeneration that promotes the symptoms of 'madness' involves a number of processes and it is too simplistic to say that it has any one cause. The accumulation of the abnormal prion is only one factor in BSE. Another significant factor is the loss of activity of the normal prion protein, which has a protective antioxidant function. Thus BSE brains are no longer as well protected against oxidative stress, which increases because microglial cells respond to the accumulation of abnormal protein and attempt to destroy it. The brain in turn responds by stimulating the production of other antioxidants to replace the activity of the lost normal prion. Uric acid is one such antioxidant and an increase was detected in BSE positive brains. Cell culture experiments showed that uric acid was primarily secreted by microglia. Although at high concentrations (>1 mM), uric acid can be toxic to cells in culture, the amount in brain tissue never reaches such high concentrations. Therefore, on the basis of cell culture experiments, I conclude that increased uric acid is probably not the primary cause of neurodegeneration in BSE. However it is important to note that increased uric acid (and other antioxidants) occurs early on in the disease, which develops over several years. These experiments cannot predict what the long-term consequences of such increases might be.

1. Lecture to the Goetheanum workers in 'Health and Illness', Volume 2, GA 348, given by Rudolf Steiner on January 13th 1923, Anthroposophic Press ISBN 0880100214 hardback, 0880100216 paperback.

Judith Sassoon

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The Nature Institute appeal

In a circular letter issued in November 2002 Bari Borsky writes: 'Since 1998, The Nature Institute has played an increasingly larger role in teaching Goethean Science. The new facility in Harlemlville has allowed for the expansion of educational offerings. Individuals looking for an intensive introduction to the Goethean approach that can be applied to their own work and everyday life are given individualized study programs. In 2002, nine students carried out individualized study programs at different times during the year. Twenty students, including a genetics professor, an environmental scientist, and a computer programmer attended an intensive week-long summer course 'Coming Alive to Nature'. The Nature Institute currently offers an 'Introduction to Goethean Science' evening course, and a well-attended fall lecture series entitled 'Enlivening our Understanding of Nature' by staff and visiting associates.

Through its publication *In Context* [see 'Publications' section in this newsletter *Ed.*], and online newsletter *NetFuture* (www.netfuture.org), The Nature Institute reaches over 10,000 readers in North America and abroad. It is through these and other publications, as well as national and international speaking engagements, that research done by The Institute is communicated to a wider audience.

The Nature Institute depends on charitable contributions to enable it to continue its work in the service of ecological wholeness and deepened human understanding. It is a 501(c)3 non-profit organization that provides a vital community service through research, educational programs, and publications. Your generous support will help us reach our short-term goal of raising \$75,000.'

Contact details: The Nature Institute, 169 Route 21C, Ghent, NY 12075. Tel: 518 672-0116. Fax: 518 672 4270. Email: info@natureinstitute.org. Web: www.natureinstitute.org.

experience of experimenting

Science Group member Malin John Starrett's new business, experience of experimenting, aims to provide quality equipment and instructions to help people call forth natural phenomena. During his doctoral research, which was generally concerned with basic natural science, Starrett realised that much modern scientific literature gives little in the way of practical instructions to help people perform experiments. There is also a lack of ready-made equipment available to enable many important experiments to be carried out. His new business sets out to rectify this.

Chladni figures kit: This kit returns to the original 19th century method. This is deliberate because, by using the bowing method of exciting the Chladni plate, the experimenter uses many different skills and abilities in full human contact with the apparatus. Thus, the phenomena are experienced in a way similar to that of many of the famous 19th century physicists who laid the foundations for modern acoustics. Moreover, producing the figures that way provides the best results in terms of well-formed patterns and musical tones. Some of the experiments can only be carried out using the traditional method.

The kit comprises a solid ash base, square brass plates of two different sizes, a circular brass disc, sand, lycopodium powder, screwdriver, spirit level, plastic bottle for resonance experiments, spare washers and fixings as well as a 105-page illustrated manual which gives step-by-step instructions for working with the apparatus to produce the basic phenomenon. Later sections guide the experimenter towards more advanced variations on the basic experiments, going sufficiently far that even

experienced acoustic physicists may find something new. Somewhat unusually for an instruction manual, the work of various researchers and issues from the history and philosophy of science, are placed alongside descriptions of the experiments.

Colour science kit. This has been designed to enable lay people to explore colour phenomena through a wide variety of simple experiments. To those familiar with Goethe's Theory of Colour, it centres on Part One of the Didactic Section — the Physiological Colours. The experiments introduce after-images, colour harmonies, complementary colours, colour phenomena on spinning discs, simultaneous contrast, coloured shadows, additive colour synthesis and subtractive colour synthesis.

The kit consists of a hand-made wooden spinning top, two ready-made discs, a forty two page A4 illustrated manual, photocopied designs for making discs, a selection of coloured papers and three pieces of stage gel. The experiments begin with the two ready-made discs. When spinning on the top, an unexpected ring of colour appears on one of them. The experimenter can then construct further discs and this leads towards an understanding of complementary colours and the circle of colours. The same principles can then be confirmed in a slightly different way through after-image experiments. The other experiments follow on from these.

For further details contact: Malin J. Starrett, experience of experimenting, Unit A28, Valley Business Centre, 67 Church Road, Newtonabbey, Co. Antrim, BT36 7LS. Tel: +44 (0)28 9055 2721.

Anthro-Tech

The Winter 2002 issue of Anthro-Tech newsletter reports recent developments at the Anthro-Tech Institute, Tobermory, Isle of Mull, Scotland. It now has a purpose-built workshop for moral technology, a natural and healthcare products shop, a guest house and centre for anthroposophical work as well as a newly acquired building — the former inn where James Boswell and Dr Samuel Johnson once stayed — which will probably house a research facility and analytical laboratory. The enterprise has adopted Rudolf Steiner's associative economic principles which lay behind the Stuttgart business conglomerate *Der Kommende Tag*, an organisation which was in harmony with Steiner's concept of the threefolding or 'three-membering' of the body social (*Sozialdreigliederung*) in that amongst other things it funded the free spiritual life in the form of scientific research, e.g. that of Lili Kolisko. The Tobermory conglomerate, currently trading as DewCross Engineering Ltd and including Anthro-Tech, owns outright the four buildings of the enterprise and is debt-free.

New people are joining, new ideas and intentions arising and new support has been forthcoming, all so much so that the co-workers are hard put to keep up with developments. Dr Judyth Sassoon has decided to join the Institute there full time and will experiment on the 'sound ether' (chemical ether), sensitive crystallisation, capillary dynamolysis, dark-field video microscopy — partly as research and partly as medical and veterinary testing.

Steigbild Dishes (update of contact details)

Glass dishes for doing capillary dynamolysis experiments are available to order at 8.50 Swiss francs each. An instruction book is also available which details how to prepare the reagents and biological extracts.

For further information please contact by post or fax Dr Heidi Flückiger, Verein für Krebsforschung, Institut Hiscia,

Kirschweg, CH-4144 Arlesheim, Switzerland. Fax: +41 61 706 7200. This information was sent by Janet Barker of Ita Wegman Klinik, Arlesheim. She can be contacted by email at janetbarker41@hotmail.com or hml@wegmanklinik.ch.

Reports – Reviews – Comment

Report

Genetic Engineering and the Intrinsic Value and Integrity of Animals and Plants – Summary of the Proceedings of a Workshop at the Royal Botanic Garden, Edinburgh, UK held by Ifgene – International Forum for Genetic Engineering on 18-21 September 2002

More than 70 people with various interests including animal and crop breeding and husbandry (both organic and conventional); environmental and moral philosophy; law; molecular and holistic biology; socioeconomics and political science and biotechnology regulation met during four days in September 2002 to work on this theme. What follows is an editorial selection of the highlights of the proceedings.

Value generated and conserved is the first fact of evolution. Life per se is defended - an intrinsic value (a good of its own, an inherent worth). Ecosystemic loci of intrinsic value are meshed into a network of instrumental value. Value is captured and transformed by living beings including humans. As part of the network they capture and enhance natural values and integrate them into the richness of culture. Enhancement promotes utility or adaptive fit in culture. Utility generated has intrinsic value. Organismic value-in-itself is smeared out to become value-in-togetherness. Ongoing defence of valued life means that not only does biological identity - the species as individuality - persist as a discrete pattern over time but also generates new achievements in biodiversity and complexity. Value seeps out into the system, and we lose our capacity to identify the individual as the sole locus of value. Intrinsic value, the value of an individual 'for what it is in itself' becomes problematic in a holistic web. Every intrinsic value has leading and trailing 'ands' pointing to value from which it comes and toward which it moves. But everything is good in a role, in a whole. Individual 'integrity' has to be 'integrated' into the ecosystem in which the individual resides. Each is for itself, but none is by itself; each is tested for optimal compliance in an intricately disciplined community. Every organism is an opportunist in the system, but without opportunity except in the ongoing system. Each is against the others, but each locus of value is tied into a corporation where values are preserved even as they are exchanged.

The foregoing puts humans firmly in the web of nature. Other workshop participants saw 'nature' as anything outside the sphere of human activity, i.e. pristine nature. This led to the idea that the more we artificialise organisms, i.e. adapt nature to human purpose with breeding methods old or new, the more we should conserve true wilderness. An alternative view sees man in partnership with nature in all its global diversity and as integrating culture and nature. Plant and animal breeding, as part of culture, should be regionally adapted and involve farmers, the people most aware of how organisms perform locally. The healthiest breeds are those whose integrity is not compromised to the point where the farmer is not guaranteed a decent human existence.

'Integrity' is a vague concept, but vagueness is the rule not the exception for concepts. Define a table, for instance! Integrity was discussed at levels beyond the organismic level implicit in the workshop title including species integrity (an ongoing widespread concern about GE especially in relation to

GM fish and insects); landrace integrity (a session was given to the current maize transgene introgression in Mexico) and integrity of indigenous cultures. Threat to socioeconomic integrity was exemplified by GM cultivar alternatives to palm oil and labour saving GM coffee varieties.

How an organism manifests is determined by its inner nature and its outer circumstances. The organism informs all its parts subject to the outer circumstances which include the chemical substances it needs to manifest itself. Amongst these are value added substances in the organism's body such as the genes, the DNA. Two unresolved conflicting views of GE were presented. One is that changing the genes of an organism does not change the organism's integrity provided that it can still function, i.e. its inherent capacity to cope with the change is not so overwhelmed that it dies. A sheep with human genes is still a sheep. The other is that changing a gene alters an organism's very nature, e.g. adding one gene can change a plant's whole growth habit. In figuring out organismic integrity and intrinsic value, one needs all the levels of distribution and integration from genes to ecosystems. Several examples throughout the workshop illustrated the fact that organismic integrity includes integrity of its specific environment which can be seen as a larger member of the organism.

In capturing and enhancing value, how far humans should impact plant and animal integrity is a matter for ethics and law. Where scientists conceive organisms as 'models', for instance GM mice, their paradigm, which includes a 'parts approach', rules out from the outset any idea of intrinsic value. The argument goes that science deals with facts; ethics should come in only when science is applied, i.e. technology. But the investigative method itself is also a technology. Therefore it also deserves ethical scrutiny. Laboratory science is not value neutral. Intrinsic concerns, hitherto sidelined in the GE debate, could play a greater part.

Regarding scientific methods, the reductionism-holism polarity was a frequently recurring theme. Both approaches were well represented by practising scientists and they agreed that neither approach is indispensable. They are complementary. And modern biology is on its way to rediscovering the organism. Although GE is the logical consequence of the parts approach, the meaningfulness of a gene is revealed only in the context of both the organism in which it is expressed and the environment where that organism is expected to function. Some unintended effects on GM plant phenotypes only manifest when they are grown under their intended field conditions. A genetic engineer who ignores the whole, risks putting simplistic, incomplete science into the marketplace. For every step taken in precise manipulation of the parts of animals and plants a step should be taken in understanding them contextually. This involves very carefully looking at the parts with the intention of understanding the whole, not seeing the whole as being out of the parts. Holism, rather than being diffuse, leads back to the organism as clear idea. The workshop included two 2-hour sessions to demonstrate and participate in such phenomenological approaches.

Concern was expressed at the hegemony of reductionist science and the disproportionate research funding it receives compared with the science underpinning for instance organic agriculture. The latter too can harbour reductionist tendencies. Organic conversion demands as much an inner transformation of thinking as an outer change in farming methods.

Looking at organisms, even in the laboratory, invokes aesthetics, the science of sense or perceptive knowledge. Whether selection occurs in tissue culture or field, the breeder makes aesthetic choices based on morphology. If we focus on utility we do not really see the organism in question but rather our-

selves because our attention is fixed on satisfying our desires. On the other hand, the beauty we behold in an organism is its intrinsic value perceived. It reminds us of the existence of values not created by man and the fact that plants and animals have a good of their own. In recognising their beauty we cannot help feeling that they deserve a certain respect, that it matters not only *whether* but also *how* they exist, i.e. under what conditions. Perception of beauty draws us into a moral relationship with other living beings which need be neither humans nor animals. We can rise from what were termed the common, the instrumental and the scientific modes of perception to the level of the personal mode of perception where we recognise the uniqueness of the living being and from this gain the knowledge necessary to love and respect it.

Phenomenological holistic observation can also help in judging where the limit should come in genetic enhancement of an organism by whatever method. In assessing breeding outcomes we should be open to the possibility that there are holistic observation methods yet to be developed, for instance qualitative and intuitive. These could have a part to play where nourishment is seen not merely as replacing substances or refuelling but providing surplus value for human creative, moral and spiritual development. How does GM impact this subtler aspect of human nutrition especially long term? Methods for assessing foods from modern breeds should supplement the concept of substantial equivalence with the additional categories of qualitative and ethical equivalence.

Much as moral intuition is an individual matter, the normative ethics needed for societal function – health, safety, freedom from cruelty etc. – brings in the need to draw firm lines in legislation. The alternative proposal that use of genetic modification should be determined by the market was objected to on the basis that in any society the market too, in order to function, presupposes a framework of rights. Efforts to establish such rights, which could include protecting the nature of an animal, will be most fruitful at the international level because governments avoid legislation that puts their country at an economic disadvantage. Relevant in this respect was the workshop session on the difficulties facing implementation of the potentially restrictive 'no, unless' statute on animal biotechnology in the Netherlands.

In public deliberations as part of the democratic process towards legislation, the term 'intrinsic value' might be too abstract and need replacing with terms such as freedom, independence, choice, dignity etc. Furthermore the focus should be on real scenarios rather than urban myths created by the media or speculative ethicists.

Some genetic modifications would be ruled out in principle but others might be judged by degree. In which case in setting the cut-off point, utility, for instance using animals for medical treatments and research (where most GM animals are used), should be balanced against the need to avoid impacting something fundamental to an animal's phenotype and thus its well-being. It was agreed that even traditional breeding has gone too far in this respect and several examples were given. Whilst it was acknowledged that GM is not likely to be used much on land animals farmed for food, a plea was made that in any future breeding the animal should 'have its say'. Artifice should not be *forced* on it but changes *elicited*.

Biologists present disagreed on whether GM is essentially different from traditional breeding although both supporters and opponents of the technology concurred that personal worldviews determine attitudes to it. Certainly both methods exploit cellular capacities to manage DNA but GM is faster, bypassing the correcting process of evolution. Apparent impacts on the health of GM organisms may be attributable to in-

vitro manipulations rather than to the transgene, e.g. somaclonal variation in potato. Breeding, prior to recombinant DNA technology, also produced unintended effects. Biotechnologists have been ambivalent when presenting the technology. To research funders, investors and patent officers it must be presented as radically new. To regulators and consumers it must appear merely 'novel', based on tried and tested methods, raising no new risks.

The phenomenon of technology lock-in was described. A society becomes committed to a technology and can only relinquish it at great cost. High input intensive agriculture calls for GM cultivars and increasingly artificial breeding methods. GM is a logical continuation. There is a very high short-term cost in escaping from this trend, for instance into sustainable or organic agriculture. In medicine the corresponding switch of resources would be to preventive medicine. But, for instance, a Swiss referendum prevented such a switch on economic grounds. Lock-in already works to the benefit of biotechnology because it helps justify the agricultural and medical solutions it offers. Problems resulting from adoption of an inappropriate technology are diminished by the system round it evolving, e.g. by favourable legislation, subsidies etc. The domination by experts and scientists of the debate on GM adoption was seen as questionable if intrinsic concerns are not part of the scientific paradigm. Instead the debate needs equitable representation of value systems.

An evening panel discussion dominated by risk-benefit considerations revealed many existing structural problems in society such as democratic processes, inequitable power apportionment, allocation of resources or problems with existing agricultural or health management methods. GE was seen as a lightning rod for such concerns.

What we do to our plants and animals, we do to ourselves. We are intimately related to the natural world. All traditional peoples knew this simple truth – one session presented the Maori idea of culture where intrinsic value is taken for granted. If we deserve respect and have rights, so does the natural world. If we uphold the integrity and intrinsic value of plants and animals, we uphold our own integrity as well. But if we disregard the integrity and intrinsic value of plants and animals, our integrity and intrinsic value will be diminished in the process.

David Heaf & Johannes Wirz

For a list of contents and ordering details of this publication please see the 'Publications' section of this newsletter or <http://www.anth.org/igfene/2002.htm>.

Review

The Light Course – Ten lectures, Stuttgart, 23.12.1919-3.11920. Rudolf Steiner. Anthroposophic Press, 2001. ISBN 0880104996. Translated by Raoul Cansino.

In order to read this volume it was necessary to forcibly hold the pages open, the sections being glued not sewn. Do publishers ever read their own books? In reviewing the 'Light Course' it was necessary to have the German edition, the original English edition (Steiner Schools Fellowship) and the new English version of Mr Cansino laid out flat in front of me on my desk! Surely such an important lecture course deserves a better production: a book which perhaps will serve as a work of reference throughout the life of its owner; the latter in turn would be prepared to bear the extra costs incurred. (cp. the high quality of the German hardback edition)

On the front cover of the volume under review is: 'The Light Course' – I would have preferred to see 'First Natural Scientific Course' as in the German edition, and then, inside, on the title page: 'First Natural Scientific Course' with the sub title:

'Light, Colour, Sound – Mass, Electricity and Magnetism'. Also on the front cover there appears, as a kind of series – Foundations of Waldorf Education. Although true, this is inappropriate because it could limit the interest of, say a physicist who had no interest or knowledge of Rudolf Steiner education – the lectures in this course being so fundamental and containing such brilliant descriptions of the Goethean scientific approach that they are of potential interest to all physicists, indeed all natural scientists, or, better said, natural philosophers, a term which Michael Faraday was happy to accept.

This new translation reads well although it is clearly American! However I cannot accept, on page 20 : 'Simply because Goethe was not a crafty mathematician...'(ausgepichteter Mathematiker).

I am pleased to see that all the Notes, with the 'Discussions Votum' are included from the latest German edition of 1987. The diagrams, on the contrary, are those used in the earlier English translation by George Adams: they are exact copies, some of which were inaccurately drawn in the first place; for example, a cone of light with curved edges. The legend too has not been changed; so we have 'Ideal' for the German 'Rationell' in Fig. 1a (admittedly a difficult one!).

The diagrams in the German edition are better although that concerning coloured shadows at the beginning of lecture VII does not appear in the German original.

Below are given the two English versions of a passage chosen at random:

George Adams (page 65) 'In this respect our bodily nature is indeed of the greatest interest even to outward appearance. There is our breathing process: we breathe in the air and breathe it out again. When we breathe out we push our diaphragm upward. This involves a relief of tension, a relaxation, for the whole of our organic system beneath the diaphragm. In that we raise the diaphragm as we breathe out and thus relieve the organic system beneath the diaphragm the cerebro-spinal fluid in which the brain is swimming is driven downward. Here now the cerebro-spinal fluid is none other than a condensed modification, so to speak, of the air, for it is really the out-breathed air which brings about the process. When I breathe in again, the cerebro-spinal fluid is driven upward. I through my breathing am for ever living in this rhythmic, downward-and-upward, upward-and-downward undulation of the cerebro-spinal fluid, which is quite clearly an image of my whole breathing process. In that my bodily organisation partakes of these oscillations of the breathing process, there is an inner differentiation, enabling me to perceive and experience the airy element in consciousness. Indeed by virtue of this process, of which I have been giving only a rather crude description, I am for ever living in a rhythm-of-life which both in origin and in its further course consists in an inner differentiation of the air.'

Raoul Cansino (pp.118-119) 'In this respect our organism presents something extraordinarily interesting. We breathe air out – our breathing process, of course, consists of breathing air out and breathing air in again. When we breathe air out, we push the diaphragm upward. Connected to this, however, the entire system of organs beneath the diaphragm is relieved of strain. Because we raise the diaphragm when breathing out, the cerebrospinal fluid, in which the brain floats, is pushed downwards to a degree. However the cerebro-spinal fluid is nothing more than a condensed modification, if I may say so, of the air, for in truth it is the exhaled air that causes this action. When I breathe in again, the cerebrospinal fluid is pushed upward. Thus by breathing, I live continuously in this upward and downward swinging of the cerebro-spinal fluid, which is a

clear reproduction of the entire process of breathing. If I live consciously in the fact that my organism takes part in these oscillations of the breathing process, then there is an inner differentiation in my experience of the airy element of consciousness. Through this process which I have described only roughly, I am placed continuously within a life rhythm consisting, both in its origins and in its course, of the differentiation of air.'

The meaning of the underlined words 'of consciousness' is not clear to the reviewer.

For the reader who is not familiar with this lecture course, an abbreviated 'Contents' follows:

Lecture 1, Stuttgart, 23.12.1919: The aims of modern natural scientific research contrasted with Goethe's methods. The situation with mathematics. Kinematics and mechanics. 2, 24.12: Bridging of the gap between kinematics and mechanics. Buoyancy of the brain. Colours arising in a prism. The antithesis of muscle and eye in relation to the astral body. 3, 25.12: Goethe's first experiment with the prism. Colours as fringe phenomena. The double-prism, convex and concave lenses. The organism of the eye. 4, 26.12: The archetypal phenomenon of the colour theory. The subjective spectrum. Fresnel's experiment. Light extinction with the sodium flame. 5, 27.12: Kirchoff-Bunsen experiment. Phosphorescence, fluorescence, coloured bodies. The opposing relationship of the human being to space and time on the one hand, and to velocity, on the other. 6, 29.12. The reality of dark and light. Darkness and matter. Gravity. The inorganic. Sound as real air waves. Discovery of the interaction of light with electromagnetic forces. 7, 30.12. Coloured shadows. The extent of the validity of the concepts 'subjective' and 'objective'. The three stages of the connection of man to the External world in Light, Warmth and Air. The breathing process and the perception of Sound. 8, 31.12. Sound and waves. Velocity is the real. Organisation of the sense of hearing: the lyre of Apollo. Connection of sound with air vibration. 9, 2.1.1920: The phenomena of electricity. The revolutionary occurrence of cathode rays and their modification; X-rays, alpha, beta and gamma rays. 10, 3.1. Experiment with cathode and X-rays. Lobachevsky and the shock to Euclidean geometry in the 19th cent. The nature-dream of modern humanity; statistical methods, etc'. Electrical phenomena and sound. Conclusions.

Henry Goulden, Cornwall

Comment

Coloured Shadows – Re: Lecture 7 of the Light Course by Rudolf Steiner

The controversy over 'whether the green shadow cast by an object illumined by a red light when a second (uncoloured) light is also present is objective or not' still continues today despite further revisions of the original German text and notes published since Rudolf Steiner's lecture 83 years ago. This also applies to the various translations into English. In the first English version made by the Goethean Science Foundation half way through the twentieth century the statement by Steiner saying that Goethe was mistaken in declaring the green to be produced by the eye (i.e. a 'subjective' rather than an 'objective' phenomenon) there was the following footnote. 'After some careful experiments on a later occasion Dr. Steiner admitted that there is an error here – see the translator's note on this passage.' Unfortunately no translator's note is to be found on any page of the book. In a later translation produced in America there is a footnote to say that there seems to be some error in the rendering of what Steiner is reported to have said.

One hopes that the editors or translators in both cases were not simply glossing over Steiner's very real error of judgement (see later in this report) because they either could not conceive of the dear doctor ever making a mistake or because they wished to hush up such a happening.

In the 2001 translation of the Light Course by Raoul Casino, published in America by Anthroposophic Press there is again no recognition of Steiner's mistake. Instead there is a long note at the end of the book commenting on repeated attempts over the next two years to carry out the experiment using long thin tubes to view the shadows without interference from other coloured surfaces in the darkened room. Apparently the results were inconclusive and it was determined to try to decide upon the 'objectivity' or otherwise of the green shadow by photographic and chemical means. That this did not lead to clarity is unsurprising, for the experiment is a simple one, only requiring the use of one's two eyes. Only muddle can arise from the use of lifeless technological processes that can never become adequate substitutes for our living human organs of perception. It may be, however that the tubes used were too thin and too long.

However, the amplified German edition of 1964 contains a reference note at the end of the book describing a repetition of the experiment by Rudolf Steiner himself. He observed the coloured shadows for half a minute and then declared, among other remarks, 'This green is only present in the context of the whole set-up. It is clearly 'subjective', as one says. Goethe is correct. The passage (in the lecture report) will be corrected – on that you may rest assured. It is not for me (said with laughter) to contradict Goethe's Theory of Colours.' Why were these remarks omitted in the 1987 German edition?

Ernst Lehrs, science teacher in the Stuttgart Waldorf School, who was present at this and further occasions when the question of coloured shadows was gone into, told me about thirty years ago that not only had Steiner agreed that he had been in error but had added the interesting remark 'I had not realised how strongly Ahriman has influenced the human sense of sight'.

Two things have to be added in part defence of Steiner's mistake.

(1) He was so busy at the time that he was unable to set up and test experiments the night before he demonstrated them – which is, of course, a cardinal error when made by any physics teacher.

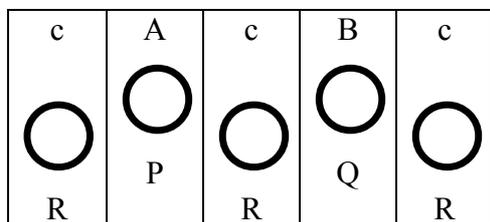
(2) He was justifiably critical of the use of the word 'subjective' to include the concept of 'unreal'. For the eye and what it contributes to the act of sight is no less real than the light and colours in the world which contribute to it.

Here I want to include a personal experience. After meeting anthroposophy in my early twenties of earthly life I read very many of Steiner's books and lectures, joined study groups and conversed with friends about Steiner's statements. I could accept and confirm many of them but most of them I could neither confirm nor deny as I lacked the spiritual perception required. Nowhere could I find a mistake, however, and this caused me some discomfort, for what human being is perfect? Having carried out the coloured shadows experiment, seen and understood Steiner's mistake, I breathed out with great relief with the feeling 'Yes, he really is human.'

The best way I have found to experience and understand the coloured shadows is as follows. Find a couple of suitable tubes. I use the cardboard cylinders around which kitchen paper rolls are wrapped. They are about 30 cm. long and have external and internal diameters of 3 cm. and 2.6 cm. (Toilet roll centres are not long enough.) First use one in daylight,

with one end close up to an eye and then also about 10 cm. away. On looking through it whilst keeping your other eye open you will notice that the circular patch of colour has a lighter hue than what your other eye perceives when kept open. Try looking at a dark cloud, for instance.

Now assemble the apparatus shown in lecture 7 of the light course. It is nicer to use 2 candles than 2 electric bulbs, but either will do. The white screen will show the following with two areas of coloured shadow.



The coloured shadows are A (deep red) and B (green) whilst the rest of the screen C is pink. Now using a tube pressed lightly against the eyelid and eye socket of the right eye (say) move the tube about to look at all 5 areas in turn. The circular areas obtained will show P as a red a little lighter than A, Q as an apparently lighter green than B and the Rs as a lighter pink than C. By keeping the left eye open you can make the comparisons A with P, etc. Then keep the tube focussed on Q and remove or conceal the candle behind the red glass and it will be found that the Q circular area will not have changed its hue, whether or not the left eye has been open or closed during this change. Then you will realise that the area Q was not originally light green at all but grey, the same colour as C became finally. Variations of the procedures described, e.g. swap eyes, will confirm the result that the original green area B is 'subjective', i.e. is caused by the eye's response to the conditions imposed by the relationship of the two candles to the screen and red glass – a real subjective event.

Ron Jarman

Comment

No progress in evolution

Henry Gee, a senior editor of *Nature*, wrote in a recent article in the journal¹ that contrary to the popular view of evolution as a progressive force that drives inexorable improvement in reality, evolution is based largely on natural selection which has neither memory nor foresight, is not a force and is directionless with respect to history. Evolution, says Gee, is not propelled by an inherent drive for improvement. Looking round for a reason why people so readily accept a view of evolution as progressive he places the blame on nature philosophy.

Gee writes 'The most famous nature philosopher was Johann Wolfgang von Goethe. [...] In Goethe we see the apotheosis of nature philosophy as a romantic reaction to what we would see as scientific detachment, seeking to place man, once again, at the centre of all things and to promote the subjective and the aesthetic in scientific observation.'

However, Schad in his essay *What is Goetheanism?* after reviewing several of Goethe's utterances on the matter concluded: 'it is clear that we cannot equate his kind of mind with those of the scientists of the romantic movement.' After citing Goethe's oft-quoted statement to Eckermann that romanticism is unhealthy Schad writes 'That went for not only romantic poets and literati but also the succeeding generation of scientists of the romantic movement. He had set his greatest hopes on them but he soon revealed his disappointment.' So only a superficial or incomplete understanding of the developing

Goethe would place him with the scientists of the romantic movement.

In the same article, Gee goes on to mention anthroposophy but does not develop anything from this reference: 'Although nature philosophy is long dead, such sentiments still find ready acceptance among alternative or 'holistic' philosophies. Anthroposophy — the world view of twentieth-century philosopher Rudolf Steiner — draws heavily on Goethe...!'

1. Gee, H. (2002) Aspirational Thinking *Nature* 420 12 December, p.611

2. Schad, W. (2002) What is Goetheanism? *Archetype* 8, 1-32. Thanks to Barry Lia (Seattle) for bringing Gee's article to our attention.

David Heaf

Review

Concerning Clones and the Lost Hierarchy: Four lectures held in March 2002 at the Anthro-Tech Institute, Switzerland. Paul Emberson. Published by Etheric Dimensions Press, Scotland & Switzerland. 104pp.

The recent premature death of Dolly-the-sheep put cloning back in the headlines, this despite the fact, acknowledged by her creators, that Dolly was not a clone. However, her creation from two adult cells, from one of which came almost all the genetic information, was undoubtedly a milestone in reproductive biology research and brought humanity a large step nearer to the possibility of creating mammals as true clones, i.e. organisms reproduced from a single individual. But we would not go as far as saying that 'Dolly marked the entry into an era in which genetic engineering will be applied increasingly to the human being and to the other realms of nature.' (page 79) In fact, genetic engineering, i.e. recombinant DNA technology, dates back to the mid 70s and human gene therapy to the early 80s. The first cloning of differentiated (adult) animal cells to give a whole animal was accomplished in a toad in 1962. Only steady research since then has made mammalian cloning possible.

The book comprises four lectures which the author gave to people known personally to him and all were familiar with anthroposophy. However, the content is certainly accessible to any lay reader who is willing to take occult teachings, some of them potentially startling, into the bargain.

Emberson puts on record, albeit late in the book, his indebtedness to Rudolf Steiner for much of the content – over an eighth of it comprises verbatim quotations from him – and to Karl König for the idea that occult cosmic evolution is recapitulated in a metamorphosed form in the human reproductive process. The 'Lost Hierarchy' is of course Man. Despite the title, the book is not so much about clones as history, both exoteric and esoteric, and the mismatch between the method of reproduction which mankind has attained and the one which was 'intended'. Here you will not find any of the mundane pros and cons of cloning that fill the many books and articles on this issue which have appeared since the birth of Dolly in 1996.

Lecture 1 gives an almost bewildering assortment of historical, scientific and occult facts including: atomism; astronomy; the quest for the tomb of St James; the DNA double helix; the Temple Legend; Dolly's birthplace – the Roslin Institute – a 'landmark in world karma'; the Rosslyn Chapel nearby, with its pertinent symbolic interior decor and Masonic connections traceable back to the Sinclair family, its builders. The lecture ends with a list of clearly formulated questions:

1. What ethical questions arise if we make big changes to our biological life cycle?
2. How are cloning and genetic engineering (GE) related to the 'eugenic occultism' which Steiner said would develop in the East?
3. How are cloning and genetic engineering compatible with the way humans should, according to Steiner, procreate in their natural future evolution?
4. What impact do the technical developments have on elemental beings such as salamanders, sylphs, undines and gnomes?
5. The world karma compound question: why Roslin Institute, why 1996 and why were Dolly's inventors those particular scientists, Ian Wilmut and Keith Campbell?

No answer to question 1 was presented. There was no bioethical deliberation in the usual academic sense in the book. Indeed, the stem 'ethic' never appeared again after the question was posed. Nor was an answer to question 4 offered and although elemental beings were later described as working in the cell cycle, we were not told how. (We understand from correspondence with the author that some of these questions will be visited in future lectures.)

Lecture 2 gives some basic anthroposophy about how the earth originated, followed by some elementary reproductive and cell biology. A large extract of Steiner's 3rd Science Course here underlines the point that embryology will not be understood without bringing in astronomy. 'Sexual attraction', says Emberson, 'is perhaps the most powerful of all the instinctive drives in human nature'. In it work the elemental beings of magnetism, later in the book referred to as *animal magnetism*.

Lecture 3 brings more history, namely of medicine, of astronomy and, more to the point of this chapter, of anatomy. Fallopio and Eustachio discovered their tubes in the reproductive tract and ear-larynx region respectively. Here we learn the basis of what informs the answer to question 3 above. Procreation will one day, according to Steiner, be out of the larynx – the masculine larynx, as sexuality as such would end and both aspects of man be recombined. Furthermore, he indicates – drawing on Agrippa von Nettesheim and contemporaries – that we should never have been born of woman but of the Earth lit by the Sun, i.e. asexually. Atlantean civilisation perverted the course of reproductive evolution and Man fell deeper into matter, into sexual reproduction, and lost his place as the fourth hierarchy immediately below the Angels.

The last lecture finally gets down to answering some of the questions raised in the first. The comet Hyakutake arrived just before Dolly and Hale-Bopp shortly after. Were they 'calling us to waken to what this bodes for mankind?' The Cain (eternal masculine) and Abel (eternal feminine) streams and the revenge of Abel in the story of Hiram-Abiff, Solomon & Sheba are presented. We read that the Cain (pro-GE) lobby is still at war with the Abel (anti-GE) lobby and that this polarity appears in metamorphosed form in the antipathy between the sexes (remember the song in *Kiss Me Kate* [alias *The Taming of the Shrew*] 'I hate men. I can't abide them even now and then?') But with Dolly, is victory for women at last technologically in sight?

Here we come to what we identify as the main thesis of the book and the author's answer to question 3. The following passages are central to the development of the proposition that Emberson is maintaining:

'...human sexual reproduction will come to an end and procreation will be accomplished in quite a different way...' (p.58) 'Dolly had a mother and a mother. She had no father. And if

the technique were applied to human beings, it would be possible to produce clones without a father. Men could be made redundant.' (p.87) 'Men, not women, will bring forth offspring in the future.' (p.88) 'The older sex, the female, will disappear in due course.' (p.89) 'From certain quarters the attempt will be made to eliminate male humanity before this development can take effect. This will be striven for, not through natural evolution but by bio-technical means.' (p.89) 'More than anywhere else, research at Roslin (Rosslyn) should have been turned towards the future, in harmony with evolution in which the female principle is abandoned altogether. I told you that Dolly had only mothers, no father. In an occult sense, that is a violation of world karma. Of course, the people involved probably have no inkling of these aspects, but that does not alter the facts. From a spiritual scientific point of view, I think the cloning of Dolly was not a step forward towards humanity's proper future: it was a declaration of war.' (p.103)

We summarise the book's main thesis as: the spirit world intends human beings to reproduce in future through a metamorphosis of the male line. But biotechnologists will strive to eliminate the male line. Dolly was made from two ewes, i.e. from the female line. This dispensing with the male line is a violation of world karma and a declaration of war.

We take issue with this. Notwithstanding the fact that *four* ewes were used in the process of making Dolly (c.f. *Nature* **385**, 810-813, 1997) and assuming that Steiner's indications about human sexuality are correct, we raise the following arguments against the thesis:

- cloning can be used to produce *both males and females*. A male somatic nucleus instead of a female one can be used for the transfer process. This is done in commercial practice, e.g. cloned bulls. That males can also be produced by the 'Dolly method' is not acknowledged in the book.
- the biotechnologists and the rich people who fund them are primarily male and if there is to be any speculation regarding human cloning, then it is likely that males will clone males.
- the nucleus used for transfer contains DNA from both male and female. The clone is analogous to a delayed identical twin of the 'donor' of the nucleus. Both the donor and the clone have the same genetic parents. The male line is therefore still represented in the previous generation.
- Deterioration in the DNA and possibly the chromosome structure of the clone during the process of sequential cloning will lead to a deterioration in biological and psychological function over successive cloning steps – we cannot call them 'generations' in the usual sense – and will necessitate further sexual reproductive stages to restore function. Furthermore, the low efficiency of the cell nuclear transfer process – under 1% of transfers result in births – and the high rate of disease and premature death in those that are born suggest that this method will never be a routine method of reproduction.
- cloning was introduced with the deliberate aim of creating an in vitro stage during which genetic modification could be carried out efficiently and produce increased supplies of transformed embryos. The focus is on mammary tissue because the interest at Roslin Institute is in producing pharmaceutical proteins in ewe milk. Given this focus, females are the obvious choice of donor nuclei. There is no sinister agenda here.

The evidence presented in the book is not sufficient to uphold the author's allegation that, by creating Dolly, Wilmut and Campbell are violating world karma or issuing a declara-

tion of war, whether or not these alleged acts are seen as deliberate. Emberson places his main thesis in the context of, amongst other things, autobiographic details of Wilmut and Campbell taken from their book *The Second Creation*. However, what Emberson presents is an *interpretation* of their biographies. We ask whether it is fair to publish occult interpretations of the biographies of still living people without inviting their comment, especially where serious allegations are involved. After all, it is worth noting that Wilmut is amongst the minority of scientists who are willing to enter into personal ethical deliberation in public. He has consistently distanced himself from human reproductive cloning and criticised those who want to do it.

To end on a stylistic note, the quotations from Steiner and others often lack full bibliographic references or they are incomplete. The claims cannot therefore be checked. This is excusable in lecture manuscripts but not lectures revised for publication in book form, least of all a book making the serious allegations that this does.

David Heaf & Johannes Wirz

Copies of 'Concerning Clones and the Lost Hierarchy' can be obtained from Hu's Gate Natural Products Shop, Ledaig, Tobermory, Isle of Mull, Scotland, PA75 6NR. Tel/Fax: 01688 302116.

Future Meetings

UK group of the Science Section

There will be meetings of the UK group of the Science Section on Saturday 8th November 2003 and Saturday 21st February 2004 for members of the School of Spiritual Science who are taking responsibility for the scientific work.

For further details please contact: Richard Swann, Orchard Leigh Camphill Community, Bath Road, Eastington, Stonehouse, Gloucestershire GL10 3AY. Tel: 01453 825617; Fax 01453 823811. E-mail: raswann@lineone.net.

Science Section, Dornach

The summer conference for section members, held in conjunction with the Agriculture Department, will be on 9-11 May 2003 at the Goetheanum in Dornach.

The autumn public conference will be on the theme of evolution. It will take place from 15-19 October 2003.

Details of both events from Johannes Kühl, Naturwissenschaftliche Sektion am Goetheanum, CH-4143 Dornach, Switzerland. Tel: +41 61 706 4210. Fax: 0041 61 706. Email science@goetheanum.ch

Reconciling holism and reductionism: the new science and practice of health care, organic agriculture and nutrition.

A conference organised by the Louis Bolk Instituut in the series 'Such is life!' at the conference hotel *De Werelt*, Lunteren, Wageningen, The Netherlands. Wednesday 14 to Saturday 17 May 2003

Topics: Historical scientific aspects of reductionism and holism; from personal experience to casuistic research: reflection on personal experience and application of this experience in the unique and complex practical environment; self-reflection in the individual research processes of the practitioner and the researcher: points of view, visions, underlying concepts; cohesion: social, organisational and economic aspects of scientific

innovation and practice; diversity of systems and life and operational styles; interdisciplinary and transdisciplinary work between research groups looking at the parts from the perspective of the greater entity; self-regulation and health of systems and organisms; awareness and information processing: additional statistics, learning process, expertise and the role of the expert, development of inner confidence; philosophy of science: the role of spiritual cosmology, holistic world view, indigenous knowledge; methodology: experiential science and cognition-based medicine, casuistic outcome research, participatory research and other new research methods; the ethics of our actions: to do the right thing with inspiration and concern, 'knowing how' and 'knowing that' coincide; bio-ethical frameworks; socio-economic impact: cost-effectiveness, fair-trade, policy.

Contributors (inter alia): Hugo Alrøe, Erik Baars, Ton Baars, Karen Gloy, Helmut Kiene, Gunver Kienle, Angelica Meier-Plöger, Niels Röling, Jörg Spranger, Henk Verhoog, Arthur Zajonc.

Contact: Simone van Geresteyn, Louis Bolk Institute Secretariat, Hoofdstraat 24, NL-3972 LA Driebergen, Tel.: +31 (0)343 523860. Fax: +31 (0)343 515611. E-mail: info@louisbolk.nl. Web: www.suchislife.nl.

Living Forms Research

The *Living Forms Research* conference and workshop which proved a success last October will be developed further this year, again in October, probably lasting from Friday evening October 10th to Tuesday morning October 14th. To access papers presented last year the website for bud research and related topics mentioned in the winter issue of *New View* is www.anth.org.uk/vortexoflife.

The venue is likely to be changed from wooden huts at Seaview Grazings in Strontian to the new secondary school in Strontian with fine accommodation – sleeping, food and meeting facilities – but this will be confirmed or otherwise in the Easter issue of *New View*, the magazine of the Anthroposophical Society in Great Britain.

Now that better funding for this work has materialised, it has become possible to donate money to those who have taken up research following last October's workshop (for camera and computer equipment) and this will also be possible for people who come this year with that in mind. Financial help with travel and accommodation costs will again be available this year. Anyone wishing to present a paper or make a research contribution should let me know. We hope there will be a larger number of people attending this year. Applications to do so should be made after the Spring (Easter) *New View* has been consulted.

Address from mid-March onwards; 67, Bowbridge Lane, Stroud, Glos, GL5 3JN.

Ron Jarman

Preliminary Announcement

Values and genes in agri-cultures: a multicultural approach to plant domestication and its historical significance for humanity and the integrity of life

Organised by *Ifgene* – International Forum for Genetic Engineering, UNESCO Paris, May 2004 (date to be confirmed)

The issues of intrinsic value and integrity of living organisms addressed in previous *Ifgene* workshops have contributed to emphasising the close kinship between genetic engineering (GE) and the cognitive approach of reductionism. The objec-

tive of this conference will be to reconsider this connection in the historical context of agriculture and plant domestication and investigate its scientific and cultural basis as well as its wider significance for our time and the future of agriculture.

Domesticated plants and animals may be seen as the most extraordinary masterpieces in human history, masterpieces that are not built in stone but with living substance. In the case of plants, the main feature of this achievement has been the enhancement of a fructification process in different parts of the plant organism. This is reflected at the genetic level by more or less important changes which are currently interpreted by molecular genetics as the basis of variation. According to this view, it is often claimed that GE is not radically new but merely an extension of what man has always done since the origin of agriculture in the Neolithic. In this context, GE appears neither more unnatural nor a greater violation of intrinsic value and integrity of living organisms than plant and animal domestication.

To stress the historical continuity in the gene modifying activity of man and emphasise the dramatic remodelling of plant domesticated genomes compared to the more limited modifications introduced by modern GE, some scientists have referred to domestication as 'Neolithic GE'. Of course, modern molecular genetics knowledge was presumably not available in Neolithic times and gene-based concepts have gained causal significance only recently in a human cognitive approach. But is 'Neolithic GE' merely a form of instinctive and unconscious GE or could domestication derive from a GE-like science?

The prevailing interpretation favours the chance and necessity worldview in which it is assumed that domestication arose by biogeographical luck out of an economic urge for survival. Yet, the global cultural coherence of the beginning of agriculture – including the identification of the species best suited for both domestication and human nutritional requirements and the independent emergence of domestication in multiple locations throughout the world in a short span of time, also points to the possibility that plant domestication relies on a knowledge, yet a knowledge which differs from modern cognitive approaches such as molecular genetics. Rather than a progression from primitive ignorance and fantasy to modern science and objectivity, the evolution of knowledge may be regarded as a transformation in modes of cognition. This perspective will be explored during the conference in two main directions.

A first insight into the origin of knowledge may be gained from the discovery by the French prehistorian Jacques Cauvin that the beginning of agriculture, hence plant domestication, was preceded by a cultural revolution, called the 'symbol revolution'. According to the British prehistorian Trevor Watkins, the emergence of religious symbols can be regarded as the beginning of abstract thinking. The advent of reductionism in the present day may thus be tentatively traced back to the Neolithic period. In this respect, GE may appear as a logical by-product of the gradual development of rationality in the course of human history. Meanwhile, the intrinsic connection of man with symbols has declined and symbols are now regarded as mere products of imagination and fantasy. But how did the creation of symbols allow the emergence of domestication? And is GE built on a subsequent decline in the perception of symbols?

Although the symbol revolution and domestication arose mainly in the South and spread out all over the world, the concomitant development of agriculture and rationality has expanded mostly into the North. By contrast the South has to some extent held back this development. The survival of a living connection with symbols and their significance for man

and nature is especially striking in traditional cultures also called 'primitive'.

A second insight into Neolithic knowledge may thus be gained by consideration of the primeval heritage preserved until now by these cultures. Globalisation initiated at the Renaissance through the conquest of the world by the North has led to the present near extinction of these cultures. Primeval cultures and symbols are not only related in their origin but also in their common fate of exclusion by rationality in modern agricultural societies.

Today, GE appears instrumental in revealing the cultural split introduced in human history by the symbol revolution and the current conflict between science and rationality on the one hand, and ethics, aesthetics, and intuition on the other. The cultural calls in society are urging us to resolve this conflict and bridge again the rational and intuitive mind by reconsidering the significance of symbols and the cultural meaning of rationality in modern consciousness. The future of agriculture and humanity may depend on a new cultural revolution, possibly of the same order of magnitude as the symbol revolution. These questions will be at the centre of the conference. They will be addressed in a transdisciplinary and multicultural approach and different forms of knowledge based on rationality, aesthetic and intuitive perception, and practice, will be given equal emphasis.

Ifgene has organised several international and national workshops in the last decade and gained experience in transdisciplinary, contradictory, open forums on questions related to genetic engineering. To widen its approach with a multicultural dimension and reach a larger audience, *Ifgene* is aiming to establish collaboration with partner institutions and constitute a consortium for the organisation of the conference. First contacts have been made with the UNESCO in Paris and the UIP (Université Interdisciplinaire de Paris).

For further details contact: *Ifgene*-France: Christine Ballivet, Institut Kepler, 6, avenue Georges Clémenceau, F-69230 Saint Genis-Laval. Tel: +33 (0)4 78 56 19 41. Fax: +33 (0)4 78 56 84 57. Email: christine.ballivet@libertysurf.fr. Web: <http://www.anth.org/ifgene/>

Publications

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.

Editors: David Heaf & Johannes Wirz. Publishers: *Ifgene* – International Forum for Genetic Engineering. Publication date: December 2002. ISBN: 0-9541035-1-3. Format: A4; 116 pages; 35 illustrations. Price: £20.00.

Contents: What do we mean by the intrinsic value and integrity of plants and animals? *Holmes Rolston III*; Engineering genesis, pioneering genetic engineering and ethics in Scotland, *Donald Bruce*; Seeing the integrity and intrinsic value of animals: developing appreciative modes of understanding, *Craig Holdrege*; Does genetic engineering impact the intrinsic value and integrity of plants? *Howard Davies*; Phenomenological studies on transgenic potatoes: genetic modification adds more than intended traits, *Ruth Richter*; Does genetic engineering impact the intrinsic value and integrity of animals? *Henk Verhoog*; Does genetic engineering impact the intrinsic value and integrity of animals? *Harry Griffin*; Why is it in the farmer's interest to pay attention to the intrinsic value and integrity of animals and plants? *Timothy Brink*; New rules for a new situa-

tion: protecting animals' interests in the era of genetic engineering, *Mike Radford*; Could genetic engineering be part of a sustainable breeding approach? *Christina Henatsch*; Naturalness and breeding in organic farming, *Ton Baars*; The socioeconomic implications of biotechnology in agriculture: exploring the issues, *Ben Davies, Caspian Richards & Clive L. Spash*; Progress towards a science of organisms: genetically modified animals, *Bruce Whitelaw*; Towards a science of organism: lessons to learn from phenomenology, *Johannes Wirz*; Making a social contract for biotechnology, *Donald Bruce*; Genetic engineering and intrinsic value: the New Zealand experience, *Alastair S. Gunn & Kelly A. Tudhope*; The relation between ethics and aesthetics in connection with moral judgements about gene technology, *Michael Hauskeller*; Maize landrace integrity and transgenic introgression: the recent Mexican experience, *Fernando Ortiz Monasterio*; Experts and the public assessing intrinsic ethical concerns: experiences with the Dutch animal biotechnology policy, *Lino Paula*; Substantial equivalence and ethical equivalence: contrasting approaches, *Sylvie Pouteau*; The intrinsic value of microorganisms, *Judyth Sassoon*. Plus summary and transcripts of all discussions.

Enquiries and orders: David Heaf, Hafan, Cae Llwyd, Llanystumdwy, LL52 0SG, UK. Tel/Fax: +44 (0)1766 523181. Email: 101622.2773 (at) compuserve.com. Further information including author profiles at www.anth.org/iftgene/2002.htm

Archetype

Issue 8, September 2002

What is Goetheanism? *Wolfgang Schad* (32 pp). Some thoughts on the oxalic acid/formic acid processes, *Judyth Sassoon*.

40 pages, A5 format. Price: £3.00 per copy including UK postage (overseas postage: Europe add £0.50, elsewhere add £1.00).

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

Elemente der Naturwissenschaft

No. 77 (2) 2002. Formveränderungen reifender Mistelbeeren, *Heidi Flückiger & Stephan Baumgartner*. Steigbilder mit Metallsalzlösungen nach Lili Kolisko, Ein Erfahrungsbericht mit Untersuchungen der experimentellen Bedingungen, *Václav Závěsky*. Bewegte Bilder, Bedeutungswelt zweier Wiesenfalter, *Daniel Kuster & Johannes Wirz*. Verstehen Verstehen, *Peter Buck*. Colloquium: Evolution ohne Retention, *Wolfgang Schad*.

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Single issues: €8.- / CHF 12.- ISSN 0422-9630

Mathematisch-Physikalisch Korrespondenz

No. 210, Michaelmas 2002 Die Pellsche Gleichung und Kettenbruchentwicklungen, *Georg Glöckler*. Die Relativitätstheorie als Resultat eines absoluten Empirismus, *Hermann Bauer*. Sein, Nichts und Werden in der projectiven Geometrie, *Oliver Conradt*.

No. 211, Christmas 2002 Ursachenlehre, Zufall und Notwendigkeit, *Renatus Ziegler*. Variation der Diagonalen bei den umstülpbaren Modellen der Platonischen Körper, *Oliver Konradt & Klaus Ernhofer*. A projective construction of the lemniscate, *Nick Thomas*. Bemerkungen zur Pellschen Gleichung und zu den primitiven pythagoräischen Zahlentripeln, *Peter Baum*.

Subscriptions are Sfr45/€25 per year. Edited by Dr. Peter Gschwind, Mathematisch-Physicalisches Institut, Benedikt Hugiweg 18, CH-4143 Dornach, Switzerland. Email: p.p.gschwind@intergga.ch.

In Context, The Newsletter of the Nature Institute

No. 8, Fall 2002: As well as short items of news, reviews and comment, the publication carries the following two main articles: Portraying a meadow, *Craig Holdrege*; Love and detachment, How we can reconnect with nature, *Steve Talbott*.

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Email: info@natureinstitute.org. Web:

www.natureinstitute.org.

Wasserzeichen

Nr. 17 (2002): Main article: Druck und Sog, Polare strömungen und Gestaltbildungen bei der Tropfenbildstehung, *Andreas Wilkens*. Apart from the main article, the 47 pages of this publication have many short contributions including items on the Flow Research Institute's work, its conferences and publications. Price €2.00 per issue. Free to sponsors.

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@stroemungsinstitut.de

New Geometry Research from Waldorf Schools

Construction Games with Kepler's Solid is a translation of a 1938 essay by the mathematician Gerhard Kowalewski. Waldorf schools students have helped in the translation. This essay concerns the three dimensional geometry of the pentagon. The geometrical facts are used to design games and puzzles.

A well illustrated appendix by David Booth has been added that describes up-to-date ways of working with Kowalewski's ideas. 85 pages, comb binding, \$15.75 US Shipping & Handling \$2.00

Report on the Domino Rule by David Booth. The 'domino rule' was discussed in the essay of Kowalewski described above. A study of the basic form of the domino rule led to puzzles in which Waldorf school students made their own, entirely new discoveries. In this booklet the puzzles are explained, known solutions are described, and unsolved problems are listed. Contains spectacular colour plates. 45 pages, comb binding, \$15.75. US Shipping & Handling \$2.00

For more information contact: Parker Courtney Press, PO Box 41531, Austin, Texas 78704, USA. Tel/fax: +1 512 440 7979. Email: parcourt@airmail.net

Tycho de Brahe Jahrbuch für Goetheanismus

2002: Geschichte und Problem des Hoherentwicklungsbegriffs, *Bernd Roßlenbroich*. Zur evolutionen Ausbildung von Blüte und Frucht bei den Hahnenfußgewächsen, *Thomas Göbel*. Korrelation von Sprossgestalt und Blattgestalt anueller Dikotyledonen, *Volker Harlan*. Streptocarpus mit Brutblatt, *Manfrid Gädeke*. Zur Dreigliederung der Käfer, *Wolfgang Schad*. Heileurythmiewirkung auf das rhythmische System, *Christian Heckmann und Christine Munch*. Signaturen der

Therapeutischen Sprachgestaltung in der Herzfrequenzvariabilität, *Dietrich von Bonin et al.*

Edited by Rolf Dorka, Roselies Gehlig, Thomas Göbel, Angelika Heinze & Hans-Joachim Strüh. Tycho de Brahe Verlag GdBR, Am Eichhof, 75223 Niefern-Öschelbronn, Germany. Contact Dr. Roselies Gehlig, Email: Chemie.Carus@t-online.de.

Waldorf Science Newsletter

Volume 9, #17: Partial contents: The Twelve Year-old Child and Orpheus; Towards a Sensible Kind of Chemistry; The Lightning Bug; The Ladybug; Exploratory Experimentation: Goethe, Land, and Faraday; Faraday's Synthetic Investigation of Solenoids; Faraday's Analytic Investigation of Induction; Geometric Addition Table: A Curious Configuration.

This publication is sent electronically (PDF) to all Waldorf-Steiner schools in North America. Spiral bound copies can be purchased for \$8.00 from AWSNA Publications at 3911 Bannister Rd, Fair Oaks, CA 95628, USA. Tel: +1 916-961-0927. Fax: +1 916-961-0715. E-mail: hwootan@awsna.org. Web: <http://www.awsna.org>.

The Dynamic Heart and Circulation

Introduction, *Craig Holdrege*. The Polarity of Periphery and Center in Circulation, *Heinrich Brettschneider*. A Dynamic Morphology of the Heart and Circulatory System, *Wolfgang Schad*. The Physiology of the Heart and Blood Movement: A New Appraisal, *Hermann Lauboeck*. Comparative Morphology of the Circulatory System, *Christiane Liesche*. Embryology of the Heart and Circulatory System, *Matthias Woernle*. Available from AWSNA Publications – see previous item for contact details.

The Plant Between Sun and Earth

For Sale: A 1952 edition of *The Plant Between Sun and Earth* by George Adams and Olive Whicher with all of the plates present. Please contact Ed Thomas at emt3@cornell.edu.

Membership

The Science Group is open to members of the Anthroposophical Society worldwide. At the discretion of the committee, non-members of the Society may join the Group as Associate Members. In addition to the 73 members listed in the hard copy of this newsletter, some overseas contacts – Section leaders etc – receive complimentary copies of our newsletter.

Treasurer's report

In the 2002 accounting year the income was £799.78 and the expenditure £651.46. The closing balance was £1,423.03. The income and expenditure were unusually high last year because £240.00 in donations in memory of Hedley Gange passed through the account and the expenditure was further increased by the purchase of a colour printer to deal with the colour plates occasionally required in our journal *Archetype* as well as payment for 2 years hire of web space for our web site. This year, a significant boost to income occurred in the form of a £400 legacy received from the estate of Hedley Gange. Last year we allocated a reserve of £250 as deficit guarantee for any future conference initiative. This was made possible by the unexpected profit on the Lili Kolisko conference in 2001. With the legacy and generally healthy state of the finances it

would appear possible to increase the 'conference reserve' to £1000 without compromising the future of the publication activities. A further justification for this is that the UK membership fee was increased in 1995 from £2 to £5 partly to create a reserve for conferences. The fee has remained unchanged for 8 years and is likely to remain so for the foreseeable future while inflation remains at such a low level. The membership subscription is currently £5 (UK), £6 (Europe) or £7 (elsewhere).

David Heaf, Treasurer

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 2003.

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