Science Group of the Anthroposophical Society in Great Britain
Newsletter - September 2004

Contents

News

Janus Head interdisciplinary journal – call for papers
Special issue: Goethe's Delicate Empiricism
Guest Editors: Craig Holdrege, Director of the Nature Institute; William Bywater, Professor of Philosophy, Allegheny College.
Please submit your writing – including poetry and fiction as well as theory – considering all aspects and applications of Goethe's methodology.

Essays on the following topics are most welcome:

- the philosophical and spiritual foundations of the method
- the historical context of the development of the method
- the impact of the method on 20th century and contemporary humanistic and scientific theorizing
- the use of the method in contemporary study of life
- creative work which reflects the scope, power, or impact of Goethe's approach to nature, imagination or knowledge is especially invited.

Janus Head is a peer-reviewed, interdisciplinary journal that is especially interested in the intersection among continental philosophy, phenomenological psychology, literature and the arts. The journal is available in hard copy and on-line formats.

Criteria for essays: submissions should be no longer than 10,000 words. Works should be typed and double-spaced. Format requirements: APA or MLA styles. Submit one disk or CD and two (2) copies to the address below. Your essay should include a brief abstract (120 words or less). Also include a brief biography for the contributors page, should your paper be accepted. Make sure to include all relevant contact information, including a permanent e-mail address. E-mail submissions will not be accepted!
Criteria for short fiction and poetry: please include a cover letter, a short biography, and correspondence information. Short fiction should be typed and double-spaced and should be no longer than 9000 words (about 36 pages or shorter). Poetry should be typed in the format in which it is intended to be printed. Three to five poems are the suggested number for poetry submissions. Submit one disk or CD and two (2) copies to the address below. Poetry, if 300 words or less, may be sent via e-mail to jhinfo at janushead.org (but please include full correspondence address). If your submission does not follow these guidelines, it will not be reviewed.

Criteria for artwork: we are seeking artists to submit portfolios to feature in the journal. Photos, slides, and/or electronic images are the preferred formats. Please e-mail the editors if you have any questions: jhinfo at janushead.org.

Note: 1. Essay and poetry submission materials will not be returned. However, art, photography and other materials will be returned, if you include a self-addressed, stamped envelope.

2. Upon the acceptance of your paper, Janus Head reserves the right to use your work for promotional purposes, anthologies, etc. However, you are welcome to publish your work elsewhere as you see fit.

3. Contributors will get a complimentary hard copy of the issue in which their work appears, as well as access to an electronic PDF file of their article for distribution. Additional hard copies of the issue can be purchased at $10 per copy at the Janus Head website.

Please send to: Editors, Janus Head, P.O. Box 7914 Pittsburgh, PA 15216-0914. Authors should include their e-mail address. Allow at least 3-6 months for the review process and editorial decisions. Notice of receipt of materials can be obtained by email at jhinfo at janushead.org.
Web: http://www.janushead.org

***If*gene**
The International Forum for Genetic Engineering – *If*gene – has changed its web site address to http://www.ifgene.org.

Correspondence

The Phenomenon of Coloured Shadows
In response to Ron Jarman's letter in the previous issue of this newsletter (March 2004), I think that some issues regarding the study of coloured shadows need to be discussed further. I read Ron's article in the March 2003 issue of the newsletter and it stimulated me to write the article which appeared in the September 2003 issue. It is true that I did not directly address many of the comments in Ron's article, nor did I specifically discuss the experiments which he described. To be honest, I think that Ron's article was very incomplete in many respects and instead of writing a critical appraisal, I thought that the readers of the Newsletter might be better served by a general overview of this field of research. By discussing the researches of Count Rumford, Gottfried Ossan and Gustav Fechner, I was attempting to show how the viewing tube produces contradictory and equivocal results when it is utilised to study the nature of unexpectedly coloured shadows. The same tool of research – the viewing tube – produces contradictory results depending on the sequence of events enacted in the experiment. Ron's article did not discuss the problems of the confusing results obtained with viewing tubes.

The experiments described in Ron's article involve a novel technique which has not, to my knowledge, been utilised previously. This technique is the viewing of an isolated region of an image through a tube with one eye, while the other eye views the whole image. I think that this technique cannot be justified in relation to the whole previous history of the science of colour. However, this is not in itself any good reason to avoid trying such a technique but it is, I think, problematic that Ron did not explain why this technique was being utilised, it being a radical departure from previous research.

If we examine the work of other researchers, the idea of the viewing tube is to visually isolate a region of an image from its surroundings, to remove any visual influence of the surroundings and thus give an 'objective' view of this region. The viewing tube is designed to remove 'contrast effects'. This question is raised by Ron's experiment: why restrict the view of one eye with a viewing tube while the other eye receives a

whole image? The fact that one eye receives a whole image tends to undermine the justification for the other eye being given a restricted view, through a tube.

In Ron's experiments, the viewing tube does not appear to serve any useful purpose. I did try Ron's experiments and I can generally confirm most of his results, but with a special note of caution about the last part of the experiment where the coloured light source is removed or concealed. At this point in the experiment, things become confusing and it is easy to fool ourselves when one hand is blindly removing or concealing the coloured light source while the other hand steadily holds the tube, all the time making visual comparisons between one eye's view and the view of the other eye. There is a lot happening here which challenges our powers of outer observation and self observation. In this situation, I think that we can easily end up seeing what we wish to see.

If there is no good reason for utilising a viewing tube in Ron's experiment, it may be useful to leave it out. If the tube is laid down and we repeat the experiment, we have simply returned to a basic coloured shadows experiment. We can see the whole little colour world on the screen and then if we conceal or remove the coloured light source, the whole little colour world disappears and we are left with a single dark shadow. In this situation, there is no confusion – when we remove or conceal the coloured light source, we can see that the physical conditions for producing coloured shadows are gone, and so is all the colour. If Ron does have a good reason for utilising the viewing tube in his experiment, it would be useful for him to explain it.

In Ron's article, he pointed towards, but did not explicitly state, problems associated with viewing tubes. For instance, he does report observations that the viewing tube tends to lighten and desaturate the colour of any region when we look through it. These observations should produce a note of caution – if the tool of research bleaches out colour, should it be utilised to verify the presence of sometimes subtle colours? In fact, the viewing tube itself is producing a 'contrast effect' in that the area of interest is surrounded by a dark field. The dark field tends to lighten and desaturate the circular spot in the centre. Again, Ron did not discuss these issues.

All of the above points towards the need for finding new ways of studying the nature of unexpectedly coloured shadows. Various researchers, including myself, have been working in this area with many different techniques, including photography. I have seen evidence which indicates that unexpectedly coloured shadows are entirely 'subjective' in nature and I have seen evidence which indicates that unexpectedly coloured shadows have a physical 'objective' presence. I have also recognised that the reality status of unexpectedly coloured shadows can move, depending on the deeds and inner life of the observer. I stand by Rudolf Steiner's original assertion that the unexpectedly coloured shadows do have a physical 'objective' presence and I have confirmed Steiner's assertion through various experiments, as have other researchers, in particular the late Hans-Georg Hetzel. However, the research is only at an early beginning. If we as researchers can move beyond the dualism of preferences for unexpectedly coloured shadows to be *either* 'objective' *or* 'subjective', many more questions begin to become more obvious. For instance:

- How are the soul-spiritual members of the human being involved in the phenomenon of coloured shadows?
- How does human consciousness interact with technological devices such as viewing tubes in coloured shadows experiments?
- Is there a correct inner orientation when studying the nature of unexpectedly coloured shadows?
- Should we turn away from the screen and try not to think about the phenomenon?
- Should we hope and will and wish for a certain result?
- Should we attempt to have a strong soul experience of the colours during the experiment?

I think that R. Steiner, probably with the help of his friends, recognised that the viewing tube is problematic as a tool of research and therefore other methods of research need to be utilised to study the nature of coloured shadows. However, the version of the viewing tube experiment which Steiner enacted in his Light Course lectures did serve a useful purpose in that it re-opened the debate regarding the nature of unexpectedly coloured shadows. In this experiment, we can see evidence which indicates that unexpectedly coloured shadows exhibit a physical 'objective' presence. *Malin J. Starrett*

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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

Wynstones School, Whaddon Green, Gloucester GL4 0UF

Programme: *Michael Dowthwaite*: Modelling The Ego's Encounter Space.

Derek Forman: (based mainly on Ernst Lehrs' *Man or Matter*) will discuss the view of Arthur Eddington that modern science views the world as a 'one-eyed colour blind spectator' and not as a fully conscious participant. The conventional view is that only motion is primary – colour, temperature, etc. are secondary, except insofar as they can be converted into mechanical energy. Thus the world is seen as the result of small particles in motion. Mankind has not yet come to terms with the fact that as particles become very small this view is no longer tenable. Heisenberg's Uncertainty Principle does not yet have a spiritual basis. Moreover, Newton explained why 'the apple fell' but does not resolve the problem as to how it got up there in the first place. For this we turn to Goethe.

Michael Friedjung has offered the following comment: 'as far as my approach to putting soul into science is concerned, it appears to me to be neither analytic, nor completely Goethean. From a study of what lies behind science, I have indications of the presence of conscious beings everywhere and of their different natures. Georg Maier, for instance, is much more Goethean in physics. However I may shock anthroposophists by saying that sub-nature exists and is what is studied by modern physics. Sub-nature cannot be wished away.'

Henry Goulden plans to discuss anthroposophical scientific research since 1919. The founding of a Research Institute at Stuttgart in 1919 with 20 members. Rudolf Steiner's role as a scientist. Steiner's background (editor of Goethe's scientific writings; encyclopaedia entries etc; philosophy of science as a key to the proper scientific method. *Truth and Science* (Weimar 1892) as a prologue to *Philosophy of Spiritual Activity*). A fairly detailed description of experimental research carried out since 1919 according to the suggestions and advice of Rudolf Steiner, concerning *inter alia*, sensitive flames; rhythms found in earth-magnetism; refinement of peat for textiles to be used for protective clothing; modification of the spectroscope; the rare gases; elementary beings in the laboratory; behaviour of electrical discharges *in vacuo* and very low temperatures etc.

Ron Jarman: 'Cubic curves and the Unfolding of Plant Life'. There are seven species of cubic curves, studied analytically or projectively, and seven stages in plant development from cotyledons through leaves, flowers and fruits to seeds.

Nick Thomas: 'Goethean Qualities and Counterspace Forms'. Are secondary qualities merely subjective, or could so-called 'qualia' sometimes be objective? How do we relate our research to the polarity Rudolf Steiner spoke about concerning mathematical clarity as the polar opposite of content-filled life? A new approach to light will be discussed in this context which overcomes the current wave/particle duality. The status of colour in physics in the light of Heisenberg's comments on Goethe's colour theory versus Newton's will also be considered.

June Woodger: 'Goethean Synthesis' – about the way we see the planetary influence on trees in several of its aspects. Her talk will be on the Friday evening and will be conducted entirely with slides.

Lectures: Friday 1 October, 7-9 pm.; Saturday 2 October, 9 am. to 5.30 pm. (approx.) with refreshment breaks-morning, afternoon and lunch time.

For further information contact Derek Forman, Tel: +44 (0)1435 873128; email: dforman1928 at hotmail.com.

The conference will take place in the building 'Windrush' – the upper-school science block comprising one laboratory and one class room with large lobby (for refreshments) and kitchen. Registration is from 4 to 6 pm. on Friday 1 October. Registration fee: £20 (not including food or accommodation)

All enquiries relating to food and accommodation should be directed to Graham Kennish, tel: +44 (0)1452 812537.

Earthly and Heavenly Harmonies

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

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 philosophy 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.

Courses

Projective geometry classes

In Brighton on Tuesdays from 7.45 to 9.15 pm. For details contact Paul Courtney, email: P.Courtney at bton.ac.uk. Address: Ground Floor Flat, 1 Surrenden Road, Brighton, East Sussex, BN1 6PA.

Schumacher College

October 3-22, 2004 Holistic Science. Tutors: Brian Goodwin, Stephan Harding, Arthur Zajonc, Craig Holdrege and Francoise Wemelsfelder. Most of Western science has involved taking nature apart and studying the resulting parts, be they atoms or rocks, genes or organs. A great deal has been learned this way, but we are only now fully realising the huge cost to the environment and to humanity. Brian Goodwin and Stephan Harding are the principal teachers on Schumacher College's MSc in Holistic Science. Arthur Zajonc is professor of physics at Amherst College, and author of *Catching the Light*. Craig Holdrege is Director of The Nature Institute, New York. Francoise Wemelsfelder is an ethologist based at Scottish Agriculture College. Masters Level Credits Available.

April 17-22, 2005 Patterns and Mysteries: New ways of learning from nature. Tutors: Janine Benyus and Rupert Sheldrake. New methods of scientific inquiry, new ways of watching and learning, can transform the way we view nature. The scientists teaching this course will help participants experience this for themselves. Janine Benyus is a life sciences writer and author of six books, including her latest – *Biomimicry: Innovation Inspired By Nature*. Rupert Sheldrake is a biologist and author of 9 books, including *A New Science of Life* and *The Rebirth of Nature*. For further information contact the Administrator, Schumacher College, The Old Postern, Dartington, Totnes, Devon TQ9 6EA, UK

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

Email: admin at schumachercollege.org.uk

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

Reviews

Developmental Dynamics *by Jos Verhulst*

Reprinted from the Quarterly Review of Biology, Vol. 79, March 2004; p.76 with the kind permission of the editor.

In recent years, developmental biology has revolutionized our understanding of comparative anatomy, called into question

traditional concepts such as homology and homoplasy, and raised serious problems with efforts to characterize individual morphological features for phylogenetic analysis. Thus, developmental dynamics is an exciting area of current research. This volume finds its inspiration not in the discoveries of the 21st century, but rather in the works of the 18th century German savant Johann Wolfgang Goethe and the 19th century Dutch comparative anatomist Louis Bolk.

Although the author has compiled an extensive amount of data on the embryology and comparative anatomy of primates and other mammals, the book would greatly profit from a more rigorous set of hypotheses to make sense of the data. Apart from features that are the same in humans and other mammals (e.g., four chambered heart, two lungs, and two eyes, among others), Verhulst finds that almost all aspects of human morphology can be placed into one of two categories: features in which adult humans resemble a stage in the development of other mammals; or features in which the morphology of humans represents a developmental extension of the morphology found in other mammals. Since the author seems to accept that the diversity of life is the result of organic evolution, one might well ask, but Verhulst does not: 'What are the possible alternative patterns?' As von Baer noted in the 19th century and Gould reiterated many times, evolution proceeds through modification of development. For Verhulst, these developmental connections between humans and other animals are evidence that human anatomy is the 'bauplan' underlying all of evolution. To the extent that we are all related, the same could be said of virtually any other organism, but they do not write books for Adonis Press.

John G. Fleagle, Anatomical Sciences, SUNY Stony Brook, New York, USA

Bildschaffende Methoden – Fragen und Potentiale: Ergebnisse einer Zusammenarbeit zur Urteilsbildung

by Martin Rozumek (with a selection of the literature compiled by *Haijo Knijpenga*).

English title: Picture-forming methods – questions and potentials: results of a collaborative study.

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Tel +41-(0)61-7064-318 - Fax +41-(0)61-7064-366.

This fourteen page report of a multidisciplinary group working from 1996 to 2003 to advise the Anthroposophical Society in Germany on funding research in this area is available as PDF or Word Document files from the author at

Martin.Rozumek at Goetheanum.ch or by download at the Institute's web site:

www.forschungsinstitut.ch/index.php?id=494

This review aims to summarise the essential content of the report. The report begins by listing some of the questions raised in a controversy that has become somewhat hotter in recent years:

- Does picture forming make a method of investigation anthroposophical and if so should the Anthroposophical Society support it?
- Haven't picture forming methods been superseded by the huge potential of modern instrumental analysis?
- What do methods such as copper chloride crystallisation, drop pictures and capillary dynamolysis actually add?
- Are they analytical procedures, holistic methods or schooling for imaginative cognition?
- Can they make etheric formative forces visible?

Views about the methods range from one extreme that claims they provide information about the 'vitality' of the substances studied, to the other extreme that argues that the tests are so irreproducible that they say nothing about quality and can at best be treated as supplementary to other methods. As for vitality, it might be better studied by morphological methods. Two critical positions risk throwing the baby out with the bath water:

- The idea that picture forming methods make etheric formative forces visible arises from an unconscious materialism which overlooks the fact that ordinary thinking has no access to the etheric realm.
- The idea that a method that excludes rationalism is unacceptable risks overlooking living processes by applying methods which are inappropriate for them.

Any scientist working out of anthroposophy lives in the tension between his background in rational, materialistic science and his knowledge of Rudolf Steiner's indications. Users of the methods have very contrasting experiences with them. For instance, capillary dynamolysis allows foods of different agricultural methodological provenances to be distinguished in blind experiments, but the method does not reveal the presence of pesticide residues in samples.

The working group went beyond a mere desk study in that they visited the research centres concerned and immersed themselves in the thought processes and conclusions of the users.

To help understand contrasting approaches, gas chromatography (GC), an example of the analytical approach, was compared with picture forming. GC was identified as applying concepts in that it relies on recognising, in an increasingly exact way as the method improves, what has already been cognised previously. GC can become a qualitative and even pictorial approach when relationships between the measurement points are considered – analysis redeemed by synthesis. In contrast, the results of picture forming methods present themselves first of all directly to sensorial observation – the forms being co-determined by the test procedure with its often subtle effects. As with GC, the result can be interpreted through applying preconceived concepts in that, for instance, features of a crystallisation picture may indicate the presence of a disease process in a patient. But the results are not unambiguously determined or independent of the investigative process and, as samples of very differing provenance but similar composition often give similar pictures, picture forming methods are not suited for substance identification.

Ehrenfried Pfeiffer stressed the need for the observer to immerse himself in pure observation of the pictures formed, holding back preconceptions, memories and generally any predeterminative cognitive content. Rather the observer should use thought to help fix what is perceived and notice interconnections in the pictures. A certain mobility in perceiving and thinking, returning frequently to the object of study, leads to an appreciation of the 'gesture' of the picture. Pfeiffer's goal was not the picture itself but the picture that emerges in the inner experience of the observer. The process helps school the imaginative cognition needed to make the method work at all. Preconceptionless perception, looking for the unfamiliar in the familiar makes it possible for the observer to form new pictures and not only puts the method in the 'Goethean' category but also opens up the prospect of hitherto undeveloped but potentially useful methods.

When it comes to assessing formative forces, we need to remember that the sample has been introduced into a complex system and this prevents us from drawing simple conclusions about the sample. A comparative method is necessary and this unavoidably calls for applying concepts just as do conventional analytical methods.

Analytical and picture forming methods have their proper places each with their potentials and limits. Both approaches can be used qualitatively provided the results are studied in the right way. Which method one uses depends on the question being asked. Science certainly needs methodological diversity.

Picture forming methods have more sources of error. Furthermore, when contemplation of results strays too far from actual perception of the facts it can become associative, thereby risking bringing the method into disrepute. Just as analysts need to be suitably qualified for their job so too do users of picture forming methods. Transparency in both the picture forming procedure and the conceptual process is needed, especially as in the present state of the method's development the conceptual process is inseparable from the observer.

A key issue is how to validate the method. Even if the true end result of a picture forming method is inseparable from the observer, it does not mean that it is subjective. But the observer does need to answer the following questions in the affirmative:

- Has preconceptionlessness been maintained so that the formed picture can speak for itself?
- Has the interaction between observer and picture been sufficiently intense?
- Has contemplation of the picture reached a stage that is clear enough to be grasped with appropriate concepts?

Agreement between observers about criteria, concepts and terms is required to make results comprehensible and comparable. Above all, a key criterion is whether the results are fruitful.

Another problem is that there is so much variability in picture forms between replicates from a single sample that many replicates are needed, sometimes as many as 20. Different replicates may have the same pictorial 'gesture' while emphasising different aspects. Efforts have been made to standardise procedures and minimise vagueness by quantifying aspects of the forms that can be quantified. However, gestures cannot be quantified. What can be standardised are the optimal conditions for picture development, e.g. by running replicated concentration matrices for both sample and reagents.

In the report's conclusion, picture forming methods were seen as a justifiable part of scientific investigation. The group's approach was to give up any attempt at making normative statements in favour of characterising cognitive processes that are used in practice on a case by case basis. Any scientific method can be called picture forming if it provokes and facilitates a 'concept-producing' cognitive attitude in pictorial contemplation of a particular area of phenomena without recourse to prior explanations.

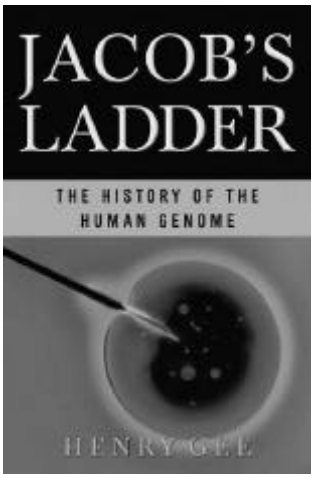
David Heaf

Is that all there is?

A review of *Jacob's Ladder: The History of the Human Genome* by Henry Gee (July, 2004; ISBN: 0393050831; h/b; WW Norton & Co)

Henry Gee, a former Regents Professor at UCLA, is a science writer for Nature. He lives in London.

In a 1990 *Science* article on the so-called 'worm project', author Leslie Roberts describes the work of Sydney Brenner on a tiny roundworm called *C. elegans*: 'After a brief flirtation with *C. briggsiae*, Brenner settled upon *C. elegans* … although it is extremely simple, it is a "real animal" … It has nerves, muscles, intestines: it reproduces. And if you hit it, it reacts. What's more, *C. elegans* is transparent: investigators can actually watch the process of development unfold in a living animal under a microscope. At the same time, its entire



life cycle is a mere six days and 100,000 of them can live in a petri dish (…) Using a laser, you can ablate one cell and be absolutely confident of what cell has been killed and what it would normally give rise to … you can look at the complete neural circuit for a particular piece of behaviour and get a complete and convincing description of the nature of that behaviour … You can look at it and say "that is all there is"'.

A little less than six months later, an article appeared in the equally prestigious scientific periodical *Nature* entitled: *Towards a new paradigm shift in biology*. It was by a scientist called Walter Gilbert, who had been awarded a Nobel prize in 1980 for his pioneering work on the DNA sequencing technology which would be used to sequence the human genome. In his *On Beyond Living: Rhetorical Transformations of the Life Sciences*, Richard Doyle quotes from what he calls 'Gilbert's manifesto for postvitality (…) No longer about "life", life science is now about the fact that there is nothing but story, nothing but information'. In Gilbert's words: 'In the current paradigm … The "correct" approach is to identify a gene by some direct experimental procedure – determined by some property of its product or otherwise related to its phenotype – to clone it, to sequence it, to make its product … The *new paradigm*, now emerging, is that all the "genes" will be known (in the sense of being resident in databases available electronically)'. (My emphasis).

According to Doyle, Gilbert was calling for 'a new basis of narratives, one that finds new density and inspiration from the "nothing" behind the massive, complete knowledges found in databases of information. This nothing is certainly no thing: rather it is a network of hardwares, wetwares and softwares …' – this is the new language of life!

In another book which probes the rhetoric behind the new gene-based understanding of what used to be known as 'life', author Lily E. Kay quotes from a 1990 article by Gilbert with the remarkable title of: *A Vision of the Grail*! Gilbert wrote: 'One will be able to pull a CD out of one's pocket and say, "Here is a human being; it's me!" … To recognize that we are determined … by a finite collection of information that is knowable will change our view of ourselves. It is a closing of an intellectual frontier, with which we will have to come to terms'. (in: D. J. Kevles and L. Hood, eds. *The Code of Codes: Scientific and Social Issues in the Human Genome Project*, Harvard University Press).

In his new book on the 'history of the human genome' – *Jacob's Ladder* – Henry Gee, senior editor at the same British periodical which published Gilbert's article, also mentions the latter, but only in relation to his discovery of the so-called *lac* repressor. However, it would seem that Gee takes seriously Gilbert's speculation that the 'instructions' for making a human being might one day be stored on a CD (and then used to make copies?). He writes: '… a parent might design a child entirely from scratch. If it is possible to create a computer model of the specific genome network of a human being, it might be possible to design humans with any desired trait, whose genome would not be constrained by parentage. The design might be synthesized as DNA, packaged into an egg and brought to term in an artificial womb (…) Somewhere along the line, these children, created entirely artificially,

would *acquire sentience* [emphasis added] by virtue of their construction according to the stock human genomic network. However, it is legitimate to wonder whether the computer representation of the human genomic network used to create these children might not itself acquire a semblance of sentience, as a result of the connectedness inherent in the program'.

Science – or science-fiction? Gee is aware of how unreal his speculations must appear to many people, but appears convinced that it is only a question of time before they become reality. He ends with the image of Jacob's ladder which gave the title to the book: 'In the Book of Genesis, God gave Jacob a vision of angels ascending to heaven [in fact, they are described as 'ascending *and* descending' – a significant difference!] and told him how his descendants would inherit the Earth. But does this licence extend to becoming angels ourselves? The transformation of human beings from apes into angels may sound like pure science fiction, something we needn't worry about any time soon. But the clouds are already gathering'.

What is one to make of this? How seriously should we take these speculations, and – a much bigger question – how much credence should we lend to the whole gene-based approach to the understanding of life? At the end of his 250-page account of what Gee calls 'the search for the agency that creates form out of the formless', he concedes that the supposedly triumphant conclusion of that search – the sequencing of the human genome – 'does not, in itself, tell us what it means to be human' and states: 'Now is the time to start learning what does'.

Unfortunately, *Jacob's Ladder* offers no clues as to where we might start. There is no apparent awareness of, and therefore no challenge to, the unreliability of the underlying assumptions, assertions, metaphors etc. which underpin the entire reductionist approach; no challenge at all to the broader claims of Darwinian evolution theory beyond a token criticism of a 'contemporary Darwin industry', which 'has bred a strain of popular science from which it would be easy to conclude that nobody knew anything about anything until Darwin arrived in 1859, as if on a fiery chariot from heaven, and gave the world his graven tables – after which the scales fell from the eyes of all, and nothing remained to be discovered'. Despite a sprinkling of caveats and cautionary admonitions, and although his cast of characters (Pliny to Odell) certainly includes some which would not normally feature in a conventional history of biology (except perhaps as denizens of the 'puddle of ignorance', to be mocked and dismissed) – he mentions Paracelsus, the Nature philosophers (three pages are devoted to Goethe alone), the preformationists, for example – I fear that Gee's history is by and large a fairly straight-line, orthodox account which was never intended to rock the establishment boat.

Even Rudolf Steiner is mentioned, but he is described only as a philosopher and his anthroposophy – which fundamentally opposed and exposed scientific materialism – is referred to only as a contemporary survival 'in its purest form' of 'nature philosophy'. In a lecture given on 28th December 1913 in Leipzig, Steiner wittily drew attention to the illogicality and inconsistency of the materialists: 'It is only because materialists are illogical that they do not embrace the only theory of cognition that goes with monistic Materialism – the "refrain-from-thinking", "think-no-more" theory … Those who wish to be pure materialists, who refuse to ascribe to thought any primal reality of its own, should really prefer to prohibit it, for if the natural world is the only real world, thought can only falsify it'. In the same lecture, Steiner states that '.. the world [the materialist] explains so beautifully with his Darwinism bears no relation to the true picture of how the world began'.

If the hold of scientific materialism on modern life is to be maintained, any primary reality of thought and consciousness must, of course, be denied. But most materialists are also sentimentalists – they shy away from hard choices and real intellectual rigour; they want all the benefits of human society and culture and the inner life – and of course want their opinions to be taken seriously, though their own philosophy, if applied rigorously, would undercut this, as Steiner points out. The reality is that virtually all materialists (and those creationists who also accept Darwinism) share a dualism which helps to mask the clarity of the only two possible philosophical options: a monism of mind, or a monism of matter. Gee shares that sentimentalism. He wants to hold onto the 'indefinable quality of humanity that makes us special: that same edifice upon which our ethical, legal and moral codes all stand, and on which our lives and loves are based' (p.249), but is content to reduce it to a valueless so-called 'Humanity Syndrome' which natural selection is supposed to have thrown up by chance some millions of years ago: 'Sentience lies …. in a qualitative change in how genes are organized into regulatory networks.. (…) This change happened just once, by virtue of a small change in the connectedness of the genomic network peculiar to the immediate ancestor of modern humans'. Really? Is this a statement of fact – or merely a necessary assumption once one has imbibed the flawed rhetoric of Darwinian evolutionary science and the 'new paradigm'?

There is no obvious attempt in *Jacob's Ladder* to even recognise, let alone break out of, the 'linguistic hall of mirrors' which Lily Kay identified as the cause of much careless – some would say 'dishonest' – talk in modern biology. Kay says that objections to the language of 'coding', 'transcription', 'information' etc. had been raised as early as the 1950s, but had obviously been brushed aside. H. F. Nijhout warned of this tendency in a 1990 essay: 'In genetics and developmental biology, powerful and evocative metaphors about genetic controls and genetic programs describe our intuition about the relation between genes and the processes that lead to biological form.

The evocative power of these metaphors, however, tends to make us forget that they are no more than working hypotheses. In particular, now that their use has become widespread among biologists, it has become ever easier to believe that the jargon represents understanding and that the metaphors describe the mechanism rather than the model.', (BioEssays 12, pp. 441-6).

It has been my contention for some time that the central pillar of Darwinism – so-called natural selection – represents a linguistic sleight-of-hand which should never have been tolerated. That Darwin was himself aware of this is clear from the words he used to describe that supposed fundamental mechanism of evolution: 'It may *metaphorically* be said that natural selection is daily and hourly *scrutinising*, throughout the world, every variation …; *rejecting* that which is bad, *preserving* and *adding up* all that is good; silently and insensibly *working … at* the improvement of each organic being ..' (*Origin of Species*; emphasis added*)*. What I believe Darwin did – thereby creating an insidious precedent which has been copied by subsequent generations of Darwinists – was to simply substitute (blind, unconscious) 'natural selection' for the consciousness, intelligence and wonderful perspicacity of the 'Being' of his 1844 essay – but to have (dishonestly) retained the intentional language without which the theory could not have appeared plausible. (See also *Evolution and the New Gnosis*, by Don Cruse and Robert Zimmer).

In *Who Wrote the Book of Life?* Kay critically examined the process by which the central biological problem of DNA-based protein synthesis came to be metaphorically represented

as an information code and a writing technology – and consequently as a 'book of life'. Hers is an extremely valuable and detailed examination of the habit questioned by Nijhout ten years earlier: 'The image of a genomic "Book of Life" – laden with biblical resonances – emerged in the 1960s and now animates human genome projects, which are so often viewed as a mammoth task of information and word processing. Driven by global capital, these biomedical projects are perceived as a mission of "reading" and "editing"... Beyond the material control of life, there is now a quest for controlling information – the DNA sequence, the "word" – frequently perceived as life's logos'.

Kay places the work on the genetic code (from 1953-1967) 'not only within the history of life science, but also along the rise of communication technosciences (cybernetics, information theory and computers), at the intersection with cryptanalysis and linguistics, and within the social history of postwar United States and Europe. The gestalt switch to information thinking in biology … was even more fundamental than the subsequent paradigm shift from protein to DNA (…) it is part of the cultural production of the Nuclear Age and the legacy of the cold war; its power amplified by the "Book's" theistic overtones across the millennia (…) once molecular biologists adopted the scriptural representations of the genetic code, once they committed themselves, consciously or not, to the information discourse and to the attendant analogies of genomic writing and reading, these representations became constitutive of the decoders' reasoning; their work was shaped by the new biosemiotics of communication (…) Even if the genome were to be a text and DNA a language, reading the "Book of Life" would be hardly unambiguous, for language is context-dependent and words are polysemic. Once the genetic, cellular, organismic, and environmental complexities of DNA's context-dependence are taken into account, biological meaning is hard to extract from the molecular syntax. (Pure upward causation is an insufficient explanation.) Even on the most basic biochemical level, protein folding … is not deducible from the DNA sequence, or "word", let alone higher-level genomic functions and multicellular organization. When "context" itself is problematized (e.g. What is the system's "outside" and "inside") and when epigenetic networks are included in the analysis, the dynamic processes linking genotype to phenotype become enormously complex. Genetic messages might read less like an instruction manual and more like poetry, in all their exquisite polysemy, ambiguity, and biological nuances. My historical critique might therefore serve to further question the role of DNA as the prime mover of all the subtle diversities of life, from archaeopteryx to thermophiles, and thereby help to loosen the grip of genetic determinism in the "marketplace of ideas"'. This close examination of the (regrettably loose) use of language allows Kay to conclude that, technically speaking, the genetic code is not a code, DNA is not a language, and the genome is not an information system.

Another recent writer who offers a challenge to the conventional view of DNA is Lenny Moss. He ends his 2003 book *What Genes **Can't** Do?* with an interesting speculation: 'It may well prove to be the case that as the newly ontogenized understanding of evolution becomes more truly secular, our understanding of life (and perhaps of matter in general) will yet become more sacred. After the (conflated) gene, it is the living organism, an active agent of its own adaptive ontogeny and evolvability, that is once again poised to move back into the ontological driver's seat'.

For the time being, it looks as if the driver's seat will continue to be occupied by the purveyors of illogicality. *Jacob's Ladder* merely adds to the confusion. Henry Gee is a devotee of J. R. R. Tolkien. He has written a book on *The Science of Middle Earth*, which will be published later this year in the USA (a UK edition is scheduled for next May). Gee apparently read *The Lord of the Rings* virtually every year between the ages of ten and twenty-five, so he will no doubt be very familiar with all its twists and turns. Perhaps he will remember Gandalf's visit to Saruman, recounted by Gandalf in the chapter entitled 'The Council of Elrond'. There was a very interesting conversation between the two wizards, which went like this:

> "For I am Saruman the Wise, Saruman Ring-Maker, Saruman of Many Colours!"
> [Gandalf] looked then and saw that his robes, which had seemed white, were not so, but were woven of many colours, and if he moved they shimmered and changed hue so that the eye was bewildered.
> "I liked white better", I said.
> "White!", he sneered. "It serves as a beginning. White cloth may be dyed. The white page can be overwritten; and the white light can be broken."
> "In which case it is no longer white," said I. "And he that breaks a thing to find out what it is has left the path of wisdom".

Goethe would have understood what Gandalf meant and would have agreed with him. Perhaps the science of biology will yet come to agree with him too, and rediscover the respect for life which alone will lead to genuine understanding.

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Publications

Archetype

Issue 10, September 2004: Mistletoe berry shapes and the zodiac, *Stephan Baumgartner, Heidi Flückiger and Hartmut Ramm.* (A Translation of: *Stephan Baumgartner, Heidi Flückiger and Hartmut Ramm* (2003): Mistelbeerenform und Tierkreis. Elemente der Naturwissenschaft 79 (2), 2-21.)

Summary: In an article published in the previous issue of *Archetype* the authors reported that the shapes of ripening mistletoe berries fit path curve surfaces and can be exactly described by the shape parameter ë. Furthermore a correlation was found between the shape of mistletoe berries and the position of the moon in the zodiac. In the present study two questions were addressed: 1) Does an unencoded determination of the ë value combined with knowledge of a hypothesis under investigation imply an unconscious falsification of the data? 2) Are the shape changes in mistletoe berries correlated with the moon's position in front of the phenomenological zodiacal constellations or with its position in front of the equidistant zodiacal signs? There was no evidence of an unconscious manipulation of the ë values with unencoded measurement when the observer knew the hypothesis under investigation in comparison with measurement which was encoded or made by an observer who did not know the hypothesis. In addition, it appears that the position of the moon in front of the phenomenological zodiacal constellations is definitive for the behaviour of the mistletoe berry shapes; a correlation of the moon's position relative to the zodiacal signs contradicts the data obtained. An attempt was also made to estimate empirically the spheres of influence or transition points of different zodiacal constellations. The data produced correlate very well with the forms of the constellations that stem from antiquity.

Experiments at Moon-Saturn conjunctions using the capillary dynamolysis method of Lili Kolisko, *Dirk Rohde.* (A translation of *Dirk Rohde* (2003) Steigbildversuche nach Lili Kolisko bei Mond-Saturn-Konjunktionen – Eine Antwort auf den Artikel von Václav Závesky. Elemente der Naturwissenschaft 79,(2), 123-131). In this article, Dirk Rohde responds to an earlier article by Václav Závesky in the same journal which concluded: 'Despite many capillary dynamolysis experiments, we cannot show in a single series of chromatograms a significant change in the pattern which correlates temporally with a particular planetary constellation.' (Závesky, Václav. Steigbilder mit Metallsalzlösungen nach Lili Kolisko. Ein Erfahrungsbericht mit Untersuchung der experimentellen Bedingungen. Elemente der Naturwissenschaft 77, 2002 (2), pp 16-52). Rohde found that in his own experiments this was not always the case. In this article he gives a short introduction on the problems facing the Waldorf school chemistry teacher when wishing to present experimental evidence of Rudolf Steiner's indication regarding the cosmic connections of the earthly metals and then goes on to describe some of his own experiments. His main finding is that the exactness of a conjunction may explain the difficulty some observers have had in reproducing Lili Kolisko's work. The capillary dynamolysis pictures in the original *Elemente der Naturwissenschaft* paper were in black and white. They were re-photographed in colour for this version of the publication.

32 pages (approx.), A5 format. Price: £2.50 per copy including UK postage (overseas postage: Europe add £0.50, elsewhere add £1.00).

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Space and counterspace: an introduction to modern geometry, *Louis Locher-Ernst*
Published by the Association of Waldorf Schools in North America (reviewed in New View, winter 2003/4) is available for $25 from http://www.awsna.org.

In Context, The Newsletter of the Nature Institute
No. 10, Spring 2004: As well as short items of news, reviews and comment, the publication carries the following two feature articles: From wonder bread to GM lettuce, *Craig Holdrege*; Science and the child, *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.
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Elemente der Naturwissenschaft
No. 80, 2004: Blicke auf das Astralische – Ein neues Bild des Stickstoffs im Naturgeschehen, *Martin Rozumek.* Der Schachbrettfalter *(M. galathea)* in ökologisch unterschiedlichen Lebensräumen des Kulturlandes, *Johannes Wirz und Daniel Kuster.* Versuchsdesign für Untersuchungen an Pflanzenblättern mit der Methode der Empfindlichen Kristallisation, *Beatrix Waldburger, Haijo Knijpenga.* 'Die Korbblüte ist etwas, was man nennen könnte einen zu schnell aufgeschossenen Baum', *Jan Albert Rispens.* Der Sprung über die Kluft – Uber verschiedene Arten, von Kräften zu sprechen, *Florian Theilmann.* Conference contributions on picture-forming methods by *Johannes Kahl, Nicolaas Busscher, Gaby Mergardt, Jens-Otto Andersen, Machteld Huber, Angelika Meier-Ploeger, Jennifer Greene, Wolfram Schwenk, Ruth Mandera, Cornelius Manthei.*
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Mathematisch-Physikalisch Korrespondenz
No. 216, Spring 2004: Das elektrische Feld und der Ätherbegriff 1, *Karl-Heinz Niklowitz*. The Matrix of the Great Pyramid of Khufu 1, *Jelle de Jager*. Laurent Schwartz, *J. P. Hornecker*.
No. 217. Summer 2004: Wärmeleitung und chemische Wirkungen, *F. W. Dustmann.* Das elektrische Feld und der Ätherbegriff II, *K. H. Niklowitz*. The Matrix of the Great Pyramid of Khufu II, *J. de Jager*.
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Wasserzeichen
Nr. 20 (2004): Wie gehen wir mit Troptbildern um? *Christine PicarieIIo.* Was ist ein Wirbel? *Andreas Wilkens.* Rühren und Flowform-Mischen bei der Herstellung der biologisch-dynamischen Feldpräparate, *Michael Jacobi.* Die Ringwirbel-Metamorphose – Part 2, *Andreas Wilkens.* Die Europäische Wasser-Rahmenrichtlinie – Fortschritt und Gefahr, *Wolfram Schwenk.* In addition to the articles in this in-house magazine, its 79 pages have many shorter contributions including items on the Flow Research Institute's work, conferences and publications. Price €2.00 per issue. Free to sponsors.
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Membership

We welcome as new members to the group, Jennifer Greene (Switzerland), James Thomson (New Zealand) and Denis Wight (Edinburgh). The Group has 72 subscribers. The membership subscription is £5 (UK), £6 (Europe) or £7 (elsewhere).

Next Issue

This newsletter is issued to members in March and September each year. Copy for the next issue should reach the editor at the address below by 20th February 2005.

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