Science Group of the Anthroposophical Society in Great Britain
Newsletter – September 2012

Contents

Obituaries

John Wilkes (1930-2011)

John Wilkes was born in 1930 in Tettenhall near Wolverhampton, three and a half years after his sister Gwyneth, and began his schooling at Tettenhall College, a small public boarding school. A dreamy child in his early years, the decision that he should repeat a year gave him a big shock, and became a decisive moment for his future. From then on he was top of his class and later became a prefect. His focus was in science, but a change came in 1946 when a new specialist art teacher arrived in the school and John became increasingly interested in the arts, with pottery his next passion. This change set him on the road to his eventual profession.

In 1948 admission directly into the second year of the Tettenhall Art College to study sculpture, was followed by acceptance into the Royal College of Art in London.

It was towards the end of his time in Wolverhampton, that he had his first contact with Anthroposophy when he attended a course at Attingham Park and met Sir George Trevelyan and Dr. Ernst Lehrs, who was about to publish his book 'Man or Matter'.

National Service now intervened, transferred to the Royal Signals Corps, he spent his service time in Austria.

On his return John followed parallel studies: that of the Royal College and also of Anthroposophy. He met George Adams for the first time in 1953, and initial questions relating to his thesis, entitled 'The living Nature of Form', led to instruction in aspects of modern Projective Geometry.

Upon graduation he was immediately asked to join Bromley College of Art to teach stone carving two days a week.

John met the eurythmist Alfhild Hammerstaedt in 1958 and offered as a hopeful young man to make a portrait of her! They got married in 1962 and had two children, Johanna and Thomas.

Through the acquaintance with George Adams, John Wilkes started to collaborate with Theodor Schwenk in the newly founded Institute for Flow Sciences in Herrischried, Germany. His task became the implementation of the path curve surfaces, developed theoretically by George Adams.

And in 1965, John Wilkes took on the sculpture courses at both Emerson College and the Rudolf Steiner Seminar in Järna (Sweden). A time of travelling between England, Sweden and Switzerland began.

In the beginning of 1970, Theodor Schwenk asked him to come back to Herrischried. Although there was no immediate task, John Wilkes wanted to work on the subject of resistance in streaming water and the resulting rhythms. During these experiments, he found that by creating a certain resistance to the water flow in a vessel with defined proportions, a pulsing figure-of-eight flow pattern would arise, thus discovering the Flowform principle, which would become the focal point of his further work and research. John Wilkes installed his first Flowform cascade in Järna (1971) commissioned by Arne Klingborg.

The sculptural work with Flowform designs found its reflection in the sculpture courses. He travelled to many countries of the world, held classes or gave lectures, installed cascades and worked with many people developing understanding of the life supporting qualities of water.

Since the development of the Flowform method, there have been more than 5000 installations and projects in about 50 countries. Flowform designs exist as artistic works, but are also used in a wide variety of applications, including:

- Biological wastewater treatment systems; using Flowform cascades in combination with reed-beds and lagoons.
- Dairy farms treat their daily effluent with Flowform cascades; transforming waste into an organic liquid fertilizer, sometimes in combination with biodynamic compost preparation.
- Drinking water and food processing, such as the production of grain milk or for baking bread.

Further projects include tap water and pond treatment, as well as homoeopathic, medicinal, therapeutic and educational applications.

All his life John Wilkes lived with fundamental question regarding water:

- How can water be used in order to be able to support life?
- How can we preserve the home of the elemental beings?
- And does water not have a function as the 'blood of the earth'?

His work was penetrated by anthroposophy and projective geometry. He was stimulated by the understanding of morphology and by the observation and contemplation of movement. His vitality and energy he received from his family, who always supported him and enabled his work to become manifest.

Having lived with a heart condition for many years, it became critical during a visit to Dornach for Rudolf Steiner's 150th birthday. "I need to move forward." John Wilkes spoke these words before the operation. The heart operation went well, however a subsequent inner bleeding could not be arrested.

John Wilkes crossed the threshold during the night towards 27th March 2011.

The spreading out of the Flowform method all around the world appears to be a reflection of John Wilkes´ outgoing qualities, enthusiasm and kindness, his capacities of meeting people with all imaginable backgrounds, with whom he would share his deep insights, his joy and inspiration.

For anyone who has experienced John Wilkes´ classes and lectures, it is unforgettable how with deep enthusiasm, joy and humour he shared his ideas and insights. He always found an inspiring word of encouragement to become more open to the phenomena around us and to deepen our capacities of observation.

Taking part in his courses on water and rhythms in nature, was a deeply impressive, aesthetic and harmonizing experience. John Wilkes' life's work and impulses certainly helped in creating a deeper awareness of the life-giving substance

water and its presence in a rhythmical context, enabling it to become capable of supporting life in so many ways.

Thomas Wilkes and Jochen Schwuchow

Bibliography (see also 'Healing Water Foundation' item opposite)
John Wilkes (2003) Flowforms - The Rhythmic
Power of Water, Floris Books
Jochen Schwuchow, John Wilkes, Iain Trousdell (2010) Energizing Water — Flowform Technology and the Power of Nature, Sophia Books, Forest Row
Website: http://www.flowform.net

News

Since the last issue of this Newsletter we have been informed of the deaths of members Henry Goulden (27 March 2012) and Ron Jarman (12 August 2012).

Rudolf Steiner on technology

In the December 2010 issue of the journal *Jupiter* published by the Section for Mathematics and Astronomy at the Goetheanum, Dornach, Switzerland appeared a 67-page review by Linus Feiten examining what Paul Emberson has recently published on the theme of modern technology. From the abstract of the English translation of the review we read that:

> It is intended neither as a polemic, nor as an attempt to refute or falsify his comments. We are fully aware that Paul Emberson and his colleagues have worked on this theme for many years, and thus know the relevant literature. Instead, this review aims to enable readers to gain an initial thorough overview of the theme. In addition, we shall not hide the fact that, after several months of study in the Mathematical-Astronomical Section at the Goetheanum of Paul Emberson's statements, we cannot go along with some of the points he makes. Furthermore, after attempting to correspond with him and visit him personally, these unresolved questions still await clarification. The impression remains that in order to be able to follow Paul Emberson on all points, one has, in a certain sense, to recognise him as an authority. His involvement over many years with technology and Rudolf Steiner's work might give rise to such confidence in him. Moreover, Paul Emberson presents some of his views as not exclusively his own observations, but refers them to another authority, namely that of Rudolf Steiner, whom many already regard as trustworthy. When it turns out to be impossible to trace where a particular statement of Rudolf Steiner is supposed to have come from, various people associated with the Goetheanum feel obliged to make this clear, and bring this to the attention of people who, having questions about Paul Emberson's comments, have referred them to those responsible at the Goetheanum. Furthermore, the Goetheanum still genuinely wishes to communicate with Paul Emberson and Anthro-Tech, but in the past months this has unfortunately been met with a wall of silence. (*Jupiter* **7**(1), April 2012)

The review contains the transcript of a letter from Martin Schüpbach former chairman of the board of Weleda AG, which had been approached for funding by Anthro-Tech in which Schüpbach concludes: "...I regard Emberson as a fraud who produces a lot of esoteric smoke round himself and uses it to live comfortably on money from supporters". The source of Emberson's material used by Feiten is a series of issues of *Anthro-Tech News – The journal of the Anthro-Tech Institute for research and development of moral technology* from the period 2004 to 2009. In *Anthro-Tech News* number 13 (Winter 2011/2012), published in English, an unnamed person, presumably Paul Emberson, wrote a robust 5-page response to Feiten's critique. *Anthro-Tech News* can be obtained from Anthro-Tech News, CH-1669 Les Sciernes-d'Albeuve, Switzerland. Full details of recent issues of *Jupiter* can be found in the Publications section of this newsletter.

Healing Water Foundation

Now a small dedicated group are working to carry on John Wilkes' legacy. Ian Trousdell, Director of the Foundation, is working with Deborah Watts and Louise Coe who are supported by a group of Trustees that include John's son, Thomas Wilkes. Paul Van Dijk, the sculptor, is closely involved as a visiting course teacher from Holland.

We are embarking on a four year development plan of steady growth that will see the realisation of the aims at the heart of the Foundation and its founder. Our vision is to share John Wilkes' insights into water and ways of working with nature to help water continue to support life worldwide.

The first step in this new phase is to raise £145,000, to secure ownership of the building at Emerson College, opened by John in 2001, and an acre of useful land around it; and to provide core funding to secure the staff and running costs for the first phase of this new development. We have so far achieved £69,500.

We feel confident that our dedicated team can continue the work of the Healing Water Foundation, and share John Wilkes' understanding of the creative secrets of water with the world.

If you want to know more about the work of the Foundation or make a donation, please email us at admin (at) healing-water.org or call us on (+44) 1342 827965."

Ian Trousdell, Director, on behalf of the Healing Water Foundation, Pixton Hill, Hartfield Road, Forest Row East Sussex RH18 5JA. www.healing-water.org

Article

Mineral water quality – Glass or PET bottles: a quality comparison using three methods[1]

Michael Jacobi, Christine Sutter-Picariello, Dorian Schmidt, Peter Stolz, Manfred Schleyer

Bottled mineral water

What do we quench out thirst with? In Germany consumption of mineral and table water packed in glass or PET (polyethyleneterephthalate) bottles is on the increase. At 0.4 litres per person per day, mineral water consumption has reached almost half the average amount that we drink daily. Mineral water containers comprise PET bottles (single or reusable), glass bottles (largely reusable) or cardboard packs. A study[2] has shown that it is frequently not the taste that causes the consumer to prefer bottled to tap water, which in many places especially in Austria, Germany and Switzerland is every bit as good as good bottled waters. It is probably more likely to be the image rather than the quality which drives the choice of bottled water although it is between forty and two thousand times more expensive. Lack of confidence in tap waters is fuelled by frequent reports of environmental contamination, combined with the increased ease of detecting ever lower concentrations of contaminants because of progress in analytical and measuring techniques.[3] In view of this, it is not unimportant to know whether or not the bottles themselves can cause a change in quality.

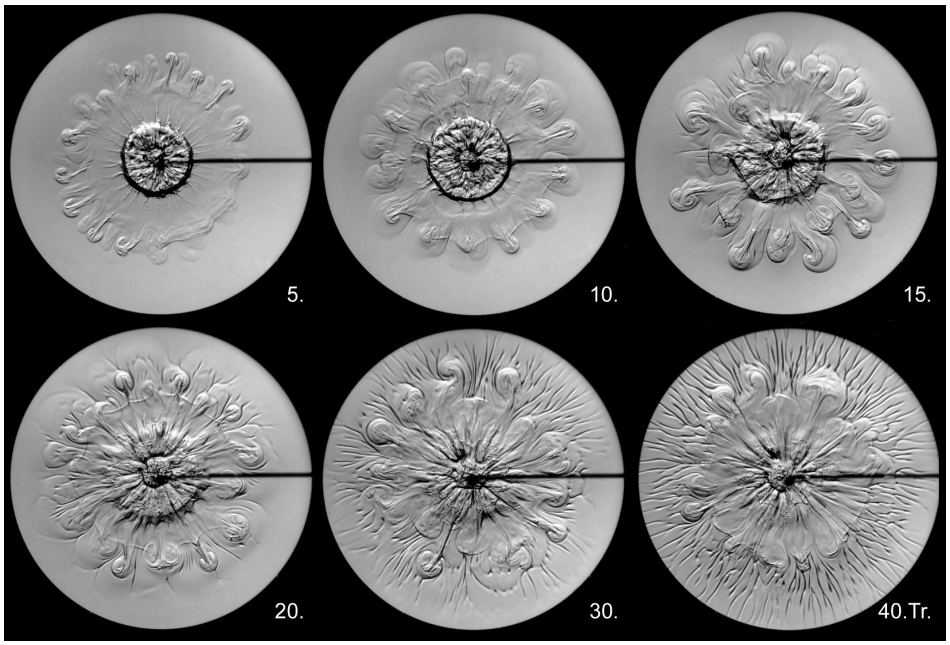
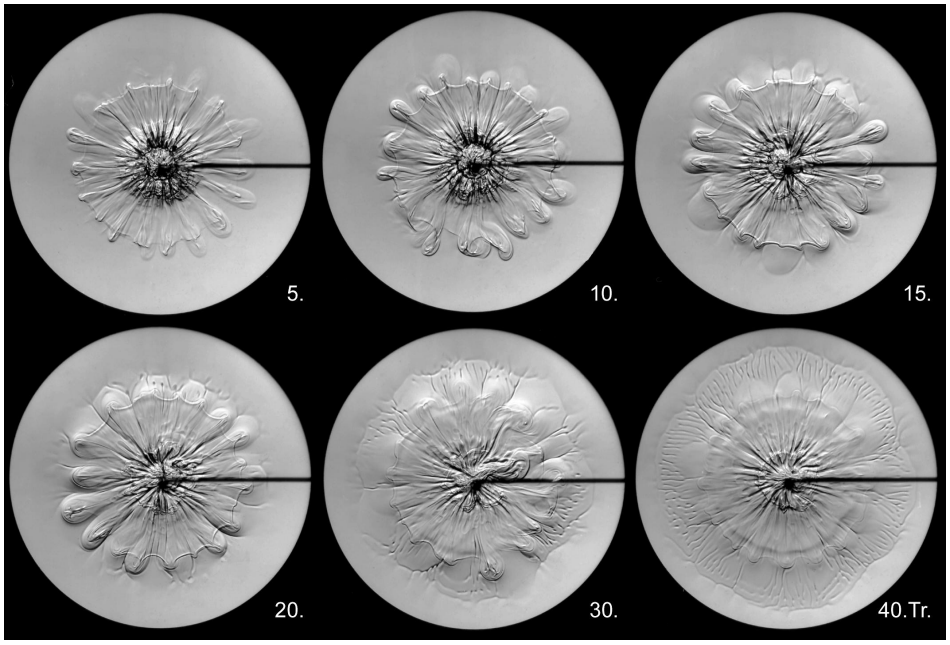


Figure 1:
Drop pictures of mineral water from glass bottles with a PE cap

Figure 2:

Top – aluminium cap with a foam plastic insert

Bottom – Aluminium cap with a plastic film seal



The numbers in Figs. 1-3 indicate the numbers of the consecutive drop pictures in each experiment.

Figure 3:
Drop-pictures of mineral water from a glass reusable bottle with an aluminium cap fitted with a foam plastic insert (Fig. 2, top)

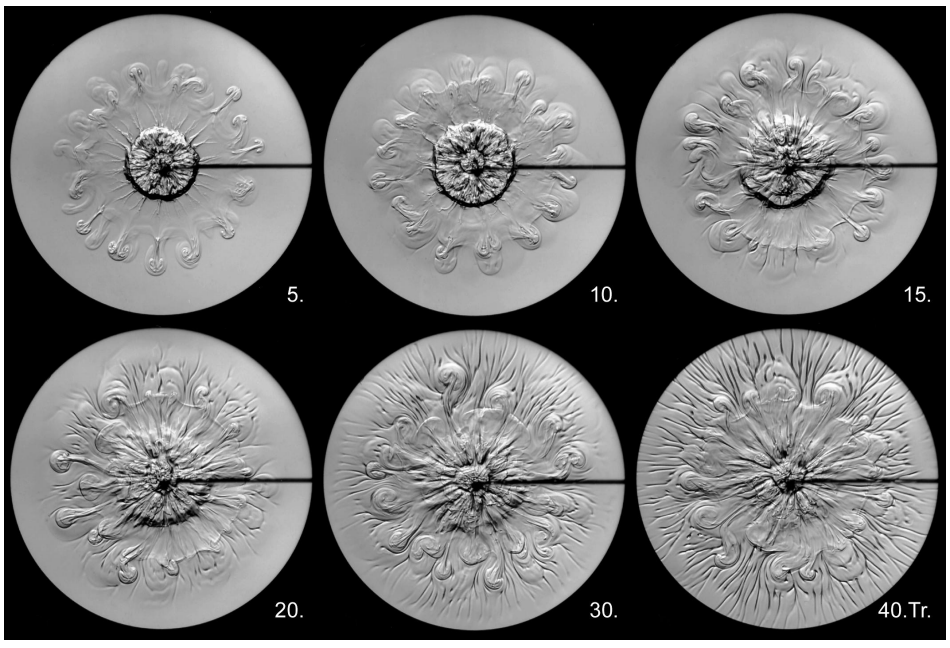


Figure 4:
Drop-pictures of mineral water from a PET bottle with a PE cap

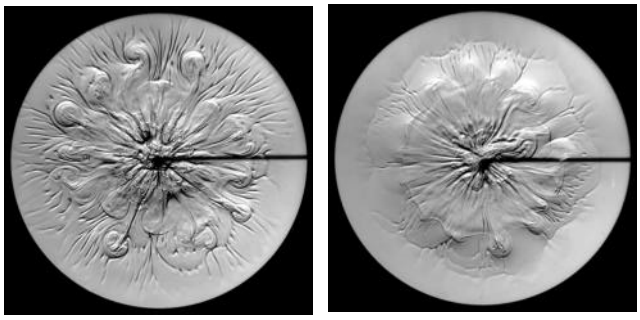
Following our first bottled mineral water project[4] in 2006, we carried out further research in 2010-2011, only this time with three methods, in order to find out whether the bottles commonly found in shops, glass and PET (both types single use and reusable) and cardboard, influenced the quality of the water inside them and, if so, how this occurs. The contents of twelve mineral water containers from seven bottling factories were selected and the original contents investigated: six in glass, five in PET and one in cardboard (TetraPak). In order to assess possible physical effects, all bottles were thoroughly rinsed and re-filled with our repeatedly tested reference spring water and then re-tested.

Three methods of investigation

Using chemical analysis, the drop-picture method, and an extended sensory analysis we aimed to arrive at a holistic picture of water quality from three different angles.

1. Chemical analysis

Chemical analysis (in this study by gas chromatography and mass spectrometry) was used to determine unwanted substances and their concentrations which are present in drinking water and which in several instances can bring about acute or chronic impairments of health.



Drop-picture 30 from Figs. 1 and 3.

2. Drop-picture method

This shows the inner flow dynamics of a water sample. Deterioration in the flow dynamics of water indicates significant disturbances in its composition.[5] Five drop-picture experiments were made from each original bottle contents, as well as for the contents of the previously emptied, rinsed bottles that were filled with the reference spring water. With additional tests we examined whether an already demonstrated deterioration arose from the bottle or the cap material.

3. Extended sensory analysis

From the assessment of food quality by sensory analysis it is known that trained and experienced testers can detect by taste a whole array of additional features besides the qualities sweet, sour, salty and bitter. A few examples of them are full, rounded, hard, soft and sparkling. Such terms indicate that tasters can describe the effects on their organism that they experience from the food . These can be identified and compared with the characteristics found when tasting a known reference water such as pure spring water. With this it is easy to see processes in connection which, stimulated by the water, are working actively in the physiology of the tester.[6]

Bottles are not all the same

The bottles in use give no cause to expect acute health impairment. But some clear quality changes can be demonstrated depending on the bottle material, cap type and repeated use. Glass can be considered the best bottle material, as evidenced by all three methods (Fig. 1). It releases almost no foreign substances into water, leaves the flow behaviour unchanged and lets the water express its effect. However, with reusable glass bottles, possible residues from the bottle cleaning process come into consideration. Thus, with insufficiently rinsed reusable bottles, a distinct diminution of the flow quality of water caused by cleaning agents occurs. A further limitation of the water quality was observed with certain caps. Polyethylene (PE) caps and aluminium caps with a plastic film as a seal (Fig. 2, right cap) were unremarkable. But, in the water tests, caps with a foam plastic insert as a seal (Fig. 2, left cap), which are used as closures for some glass bottles, showed clearly measurable concentrations of plasticizers. These waters were classified regarding flow dynamics as spoilt (Fig. 3). Chemical analysis of water from PET bottles and cardboard cartons (TetraPak) showed contamination. By extended sensory analysis hardening effects were reported. And in the drop-picture experiment an influence on the inner motility of water was to some extent observed.

Results of the three different methods

1. The extended sensory analysis showed that many mineral waters exhibited good drinking qualities, such as refreshing and invigorating, enveloping with streaming and empowering forces, and a strengthening of consciousness. In addition, perceptions arose which describe the water's individual quality. Glass bottles allowed waters to best express this when they were not spoilt by inappropriate caps such as those of aluminium with a soft, foam plastic material. With PET bottles, the water-typical perceptions were greatly reduced and such waters showed rigidifying or solidifying properties. Such a tendency was even more pronounced with TetraPak.

2. Waters from unspoilt glass (Fig. 1) or PET (Fig. 4) bottles gave living, multiform drop-pictures with great 'species diversity' of the eddy forms, comparable with the drop-pictures of a good spring water that is in its original natural state. Water from some PET bottles and from the cardboard carton produced a supra-eddying of the water which is frequently evidence of the influence of substances that do not belong in drinking water. To some extent diminutions in the flow diversity occurred depending on the type of cap. Caps of PE had no effect on the drop-pictures of water from glass or PET bottles. In contrast to the single use glass bottles with PE caps, the water samples in reusable bottles with aluminium caps containing soft foam sealing material clearly restricted the drop-picture flow dynamics (Fig. 3). After rinsing out the reusable bottles and using a PE cap, this spoilage disappeared.

3. Chemical analysis with reference samples of known concentration showed the presence of various water contaminants in low concentrations. Although all the measured amounts of these substances were within currently valid legal limits, the substances are to be regarded as an avoidable adulteration of water. Only the water from glass bottles with PE caps was residue free. Low concentrations of contaminants occurred in water from other glass bottles as a result of the cap seals. The aluminium cap with a soft foam plastic sealant released detectable quantities of plasticizers. Glass bottles in comparison with PET bottles showed hardly any detectable substances typical of plastics, and lower values for antimony. The cardboard carton (TetraPak) showed in low concentrations a great number of contaminants in the water. The mineral waters in reusable bottles had small amounts of additional substances which are probably residues from the washing process.

Summary
Firstly we can rule out any acute health risk from the materials that are used. Nevertheless, the results raise the question as to whether they give cause for satisfaction. Properly characterising the quality of any particular thing goes beyond establishing whether or not acute dangers may arise. The materials used in the manufacturing and packing processes, when considered together, result in significant quantities of substances entering our food whose long term consequences are hard to envisage. The drinking water regulations require the reduction of contaminants in tap water to a minimum. We should demand the same for bottled water.
This research shows that it is already possible to supply uncontaminated water in glass bottles fitted with an appropriate cap. This allows water, an important part of our sustenance, to express its original quality without being spoilt.

Acknowledgements
This research was carried out in cooperation with Peter Stolz, KWALIS Qualitätsforschung Fulda GmbH, Fulda, for the chemical analysis, and Dorian Schmidt, Forschungsring Biologisch-Dynamische Wirtschaftsweise e.V. Darmstadt, for the extended sensory analysis. Christian Liess and Andreas Wilkens also participated in the project. The execution of the project was possible thanks to the support of the Interessengemeinschaft für gesunde Lebensmittel, Fulda, the Mahle-Stiftung, Stuttgart, and an additional donor.

1. Revised edition of an article in *IG FÜR Zeitung*, Interessengemeinschaft für gesunde Lebensmittel, Fulda, **1**, 2012, pp. 4-5; this is a slightly changed edition of an article in *Das Goetheanum* **42**, pp. 14-15, Dornach, Switzerland, (2011).
2. Uwe Pöhls: Mineralwasser vs. Leitungswasser – eine Frage der Qualität, Lifestyle oder nur Ideologie? Ergebnisse einer explorativen Studie, IESK, Neuss, Web: www.iesk.de.
3. Kož išek, F. (2012) Medikamentenrückstände in Trinkwasser. *Wasserzeichen* **35**, April.
4. Wolfram Schwenk: Mineralwasser – auf die Flasche kommt es an, *Wasserzeichen* **24**, April 2006, and Wolfram Schwenk: Mineralwasser – Wie Flaschen ihren Inhalt beeinflussen, *Wasserzeichen* **25**, November 2006.
5. More detailed descriptions of the method can be found in: A. Wilkens et al. (1995) *Wasser verstehen lernen*, Herrischried; W. Schwenk et al. (2001): *Schritte zur positiven Charakterisierung des Wassers als Lebensvermittler*, Herrischried, Germany.
6. This method follows work of Dorian Schmidt and his rational research of formative forces. More detailed descriptions of the method can be found in: Markus Buchmann: *Bildekräfteforschung*, in preparation; Dorian Schmidt (2010): *Lebenskräfte – Bildekräfte, Methodische Grundlagen zur Erforschung des Lebendigen*, Stuttgart; Jürgen Strube (2010) *Die Beobachtung des Denkens*, Dornach, Switzerland.

Meetings

UK Group of the Science Section
The Science Section for members of the School of Spiritual Science who are taking responsibility for the scientific work has been meeting twice a year in autumn and spring.

The next meeting is on Saturday 10th November 2012 in the Festival Room, Ruskin Mill College, The Fisheries, Horsley, Gloucestershire, GL6 OPL.

The Provisional Agenda is: 10:15 for 10:30 Free rendering of Lesson 3 given by Howard Smith (blue cards needed); break; Constructing evolutionary relationships, *Judyth Sassoon*; Introduction to work on circular motion, *Gordon Woolard*; Remembering Ron Jarman. Lunch in the café; Walk to the new Field Centre; Report on future developments; Other contributions? Business: arranging future meetings/conferences/joining up with other science groups. Close: 4:30 p.m.

If you are interested in attending, but do not normally receive notification of Section meetings, please contact Alex Murrell, 26 Arundel Drive, Rodborough, Stroud, GL5 3SH. Tel: 01453 766484 Email: alexandermurrell (at) hotmail.com.

Research Group
Following the death of Henry Goulden, the next meeting in Buckfastleigh of the Research Group is likely to be devoted to considering its future form and direction.. Such a meeting will probably take place in Spring 2013.

For further information please contact: Paul Courtney, PaulRC (at) btinternet.com, 1 Surrenden Road, Brighton, East Sussex, BN1 6PA. Home: 01273 557080 Mobile: 07903 961390.

Projective Geometry
A small group meets weekly in Brighton, currently on Mondays, to explore the laws of the space underlying physical and living forces.

Please contact Paul Courtney on 01273 557080 or 07903 961390 or at PaulRC (at) btinternet.com for further details.

Welcher Art ist die Wirklichkeit der Atome? 100 Jahre Bohrisches Atommodell (Atoms: what kind of reality do they belong to? One hundred hears of the Bohr atomic model)

A conference of the Natural Science Section at the Goetheanum.

Dates: Thursday 4 October to Sunday 7 October 2012. Venue: und Mediziner, Herausgeber des Basis-Lehrbuchs, Witten/Annen Institut für Waldorf-Pädagogik, Annener Berg 15, 58454 Witten, Germany.

Contributors: Peter Buck, Klaus Eiben, Wolfgang Häußler, Johannes Kühl, Patrick Lang, Martin Rozumek, Wilfried Sommer, Andreas Strunz, Jan-Peter Meyn, Florian Theilmann, Ulrich Wunderlin, Axel Zeeck. Cost: 225.00€ (students 115.00€)

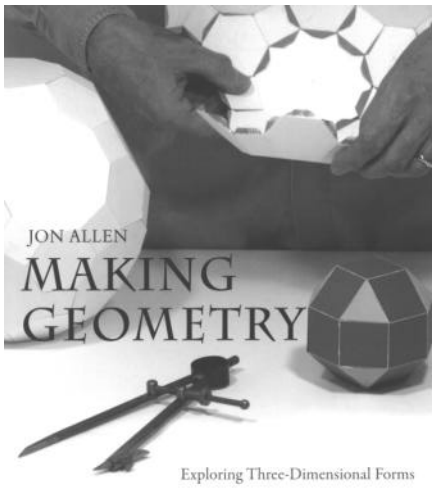
For more information contact: Naturwissenschaftliche Sektion am Goetheanum, Barbara Schmocker, Postfach – CH-4143 Dornach 1. Tel. +41-61-7064-210 – Fax -215. science (at) goetheanum.ch. www.science.goetheanum.org. Download conference programme, speaker profiles and summary content: http://www.science.goetheanum.org/fileadmin/nws/tagungen/AtomismusTagungDownload.pdf.

Reviews

Philosophie und Anthroposophie: Die philosophische Weltanschauung Rudolf Steiners. Grundlegung und Kritik by Hartmut Traub (Stuttgart: Kohlhammer, 2011). This review will soon appear in German in the journal *Die Drei*. An English version of the review will be produced and published in due course.

The main merit of Hartmut Traub's recent book is to have comprehensively situated Steiner's thought within the stream of philosophy with which it shares the most intellectual affinity – German idealism, and particularly the works of Johann Gottlieb Fichte. On account of its polemical nature, selective quotes and contradictory theses, Traub's text encourages one to return to the original writings of Steiner and to compare them with the works of other philosophers. In addition to his research on Immanuel Hermann Fichte, perhaps Traub's most

original contribution is to have drawn attention to J.G. Fichte's Way to the Blessed Life (1806), a text that is crucial for understanding Steiner's Christology, but one which has been largely ignored by Anthroposophists. Nevertheless, for a work of 1,000 pages called Philosophie und Anthroposophie, and which proclaims itself as the new standard on Steiner's philosophy, the many grave omissions in Traub's book cannot be overlooked. They include his lack of an understanding of Steiner's philosophical method and terminology; a failure to investigate Steiner's claim that the historical roots of his thought reach back to Thomas Aquinas and Aristotle; and even though Steiner explicitly points to Goethe's idealism as one of the key inspirations for his philosophy of freedom, Traub simply rejects in advance any possible philosophical influence of Goethe on Steiner. With such a contested and controversial figure as Rudolf Steiner, a precise and fair analysis of both the spirit and letter of his writings is needed. One could indeed trace the historical origins of the term "Anthroposophie" back two hundred years to philosophers such as Robert Zimmermann, Immanuel Hermann Fichte or I.V.P. Troxler, and naturally this philological aspect is important. However, in his foundational lecture of 3rd February 1913, "Das Wesen der Anthroposophie" (The Essence/Being of Anthroposophy), given during the first general meeting of the newly founded Anthroposophical Society, Steiner proposed that the stream of "Anthropo-Sophia" could be traced back not just two hundred years, but more than two thousand years, to the birth of Sophia (wisdom) in ancient Greek thought. A century after Steiner's talk a scientific study of his claim for a more ancient philosophical heritage of "Anthroposophy" still remains a desideratum in the research. *David Wood*



Making Geometry – Exploring Three-Dimensional Forms by Jon Allen
Floris Books, 2012, ISBN: 978-086315-914-5, 136 pp, £12.99

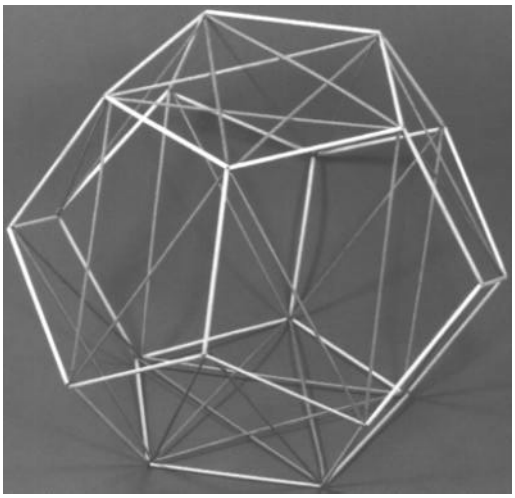
This beautifully presented book, with 144 colour photographs and 120 black and white drawings, gives practical instructions on how to make the five Platonic regular solids and thirteen semi-regular Archimedean solids. Although most of the book is devoted to paper models and their templates, there is also a section on stick models which help in visualising the other forms contained within them.

As the book is almost entirely a manual, there is understandably no attempt to compare the forms with forms found in the natural world, e.g. crystal structures. Only on page eight is a brief reference to geometry as an 'insight into the way the world is made'.

The meticulousness of the practical presentation could profitably be applied under the same title *Making Geometry* to the more organic forms created by ruled surfaces, thus marking a transition from Euclidean geometry to projective geometry. This can be achieved with stick or string models, the construction of some of which are included in *Projective Geometry* by Lawrence Edwards (Steiner Books, 2003).

David Heaf

Below: Stick model of the dodecahedron with pentagrams and reinforcing triangles using two colours of sticks (from page 22).



The Quality of Numbers 1 to 31 by Wolfgang Held. Floris Books, 2012, ISBN 978-86315-864-3, 141pp, p/b, £7.99.
The cover description, a 'readable little book', is all the more apt for the book having the equivalent of some 55 pages as white space. One wonders: readable by whom and for whom is it intended? In my view it easily accessible to the general reader and may provide teachers with plenty of material that is difficult to find elsewhere, at least in a single book, for enriching maths lessons. Readability is also secured through the good quality of the translation.

The book's formula is simple: think of a number and then list all the things that you can associate with it. Thus associations come from *inter alia* the mathematical properties of the numbers, the natural world, the world religions, and mythology. Sometimes the associations seem a little arbitrary, for example in Chapter 9 the list of four composers who 'completed' 9 symphonies. Where does that leave Mozart or Haydn?

Here is a sample paragraph from Chapter 4:

> Since Einstein we have assigned four dimensions to space-time. Animals walk on all fours, and the car drives on four wheels. Physics knows that four fundamental forces maintain the world's coherence: in the larger world these are gravity and magnetism, and in the minuscule world of the atom, we have the weak interaction which keeps molecules together, and the strong interaction which joins particles together in the atom. Likewise, there are four forces of the psyche in the temperaments. Based on the ancient world's view of the four elements, the soul can similarly be seen as solid (melancholic), liquid (phlegmatic), airy (sanguine) or fiery (choleric).

Most chapters have one or more paragraphs set in a slightly smaller font text boxes. There seems to be no obvious reason for this as the contents of the boxes merely continues the list of facts in the main text.

I found only one wrong association in the book: on page 33 the author assigns four petals to the buttercup. In fact it has five or more. A better choice would have been one of the Cruciferae. The statements 'there are also blossoms with three petals' (p. 33) and 'only flowers with four, five six (or many) petals exist' (p. 41) are contradictory. The former is correct. Even the arctic starflower, mentioned in Chapter 7 (p. 41) as having seven petals, can have a variable number from 6 to 9.

David Heaf

Publications

An Optics of Visual Experience by Georg Maier. Translated by Henry Saphir and John Barnes. 2011. Adonis Press. ISBN 978-0-932776-41-9. 222pp. p/b. £22.95.

We hope to feature a review of this book in the next issue.

Jahrbuch für Goetheanismus

2012: Die Senkrechte in der Evolution: 'Wieso liegt die Fluke beim Wal quer?', *Jörg Ruof*. Knochenbildung in Wechselwirkung mit der Atmung hei Süßwasser-Schildkröten, *Roselies Gehlig*. Peripherie und Zentrum – Indizien für Umstülpungen im Pflanzenwachstum, Manfrid Gädke. Immerwährende Bewegung – Meeresströmungen zwischen Sonne und Erde, *Susanna Kümmell*. Ur-Experimente zur phänomennahen Bildung der Begriffe 'Polarisation des Lichtes' und 'Optische Aktivität einer Suhstanz', *Albert Pröbstl*. Goethes und Schillers Xenien über 'Die Philosophen', *Lukas Klipstein*.

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