

Annual Report 2010

Research Institute at the Goetheanum

Editorial

Dear Readers,

Throughout the last year, our Institute for basic research on anthroposophically orientated and Goethean science has focused primarily on two themes: life and colour.

We worked on four projects in relation to life. It is always important to develop an understanding of the processes connected with life with methods that are appropriate to life. In relation to the theme of epigenetics, we carried out our own experiments with *Senecio*. Life is also connected with the cosmos, and we are pleased that Renatus Derbidge has started a project with us on changes in the shape of mistletoe berries and the constellations of the moon, taking forward the work of Lawrence Edwards. In two further projects, we have investigated questions in relation to healing plants. In one, Ruth Richter studied the selection and production of biodynamic seeds. In the other, Torsten Arncken conducted several projects for Weleda AG.

On the bicentenary of the publication of Goethe's Theory of Colours, we had an opportunity to present the exhibition Experiment FARBE at the Goetheanum. That was

very successful and produced lots of positive feedback. About 10,000 visitors came during the three months it lasted. Part of the exhibition was shown, among other places, at Humboldt University in Berlin, and next year it will appear in Järna with the James Turrell exhibition. A 'book of the exhibition' was also published. A second book on atmospheric colours is in press.

It was with deep regret that we learned from Nicolai Fuchs of his decision to leave the Goetheanum and thus our Institute. Colleagues experienced this as a great loss. Now we welcome our new collaboration with the new leaders of the Agriculture Section who will work in Dornach, Jean-Michel Florin and Ueli Hurter.

As regards the serious financial restrictions at the Goetheanum, during the coming year we need to look for new ways of funding our Institute. At the end of this report we discuss the challenges associated with this.

We warmly thank all those who have supported our work! And, dear readers, we hope you get a stimulating impression of the work of our Institute.

Johannes Kühl & Johannes Wirz

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Contents

Goetheanum Research Institute	5
Wild relatives of cultivars for the seed bank	8
Rhythmic shape changes in mistletoe berries	10
The second year of the groundsel project	11
Understanding healing plants	14

Complementary spectra as self-determining partial phenomena	16
Experiment FARBE – 200 years of Goethe’s Theory of Colours	18
’Does the world exist within me? How does reality arise?’	20
A brief report on sensitive crystallisation research	22
Blood crystallisation laboratory	23
Evolution and breeding ? a conference at Witzenhausen	25
Elemente der Naturwissenschaft	27
Published books	28
Discussions – working with the public and with the Section	29
Agriculture Section	31
And to conclude...	33
Addresses, Internet etc.	37
Staff	40
Recent publications by co-workers at the Institute	42

Goetheanum Research Institute

Institute for Contextual Science (ICS)

Johannes Kühl & Johannes Wirz

Aims

In our Research Institute, we develop and deepen the scientific aspect of Section work of the School of Spiritual Science at the Goetheanum. It is a collaboration of the Natural Science Section and the Agriculture Section. We are open to co-operation with other Sections.

We are convinced that active research, methodologically based on anthroposophy, is essential properly to deal with the issues of our time and the challenges that arise in the various fields of anthroposophical endeavour. In our view, this research is an essential part of the remit of the Goetheanum and its Sections. The Goetheanum is a place that is unique in the scope of its interdisciplinary potential and in the worldwide origins of its visitors.

Methods

Following on from Goethe's scientific work and Rudolf Steiner's spiritual scientific work, recent decades have seen a steady development and testing of phenomenological methods. We are nevertheless continuing our efforts to redevelop our research methods and adapt them to the object of research, i.e. to discover the method of approach that is appropriate in each case.

This seeming contradiction of developing a method for an object before we have studied it is characteristic of our way of working. Science, as a process, requires a constant movement back and forth, a kind of 'breathing', between scientific investigation and re-examining its methods. The concept is brought to the phenomenon as a kind of 'courting' (*Werbung*, an expression coined in this context by Hermann Poppelbaum),



Colloquium at the Research Institute

and the open question is: will the phenomenon accept it? Thus the scientist is taught by the 'object'.

This approach can introduce several ways of looking at the matter. In the sense of 'cognitive holism' (McClamrock 1989, Caruana 2000, Leiber 2008), our experiential approaches integrate analysis, idea- or phenomena-orientated phenomenology and practical meditation 'into the whole'. This kind of research is not confined to reading the literature, but depends on observation and experiment. Our method is immanent in that the full significance of our results is understood only through their concrete relationship to the human being. 'Wholeness' arises in the human being, and yet also belongs to the object of study.

Projects

The Research Institute concentrates on basic research. We connect current research issues and the way we tackle them to anthroposophy. This approach is usually not possible in other institutes because of the nature of their remits. We aim not so much at a direct application of our results, or at producing scientific evidence for statements made by anthroposophists, but rather at a specific understanding of the real essence of

the subject, combining the approaches to nature and to anthroposophy, so as to be able to do justice to a scientific consciousness.

Depending on the research projects in hand, we work with other institutions and universities (currently Potsdam University, Leuphana University, Lüneburg, and Humboldt University, Berlin), which have access to additional experimental resources. Our results are intended to help the further development of fields of anthroposophical activity as well as contribute to scientific culture in general.

Education

We currently offer the following possibilities for education: a week's extension course in anthroposophy for farmers; a summer university course on the study of the living world, and we also supervise individual students at the Goetheanum who are doing science research projects.

We are considering various additions to our educational programme, for example weekend seminars for students or weekend courses for lay people interested in anthroposophy and science.

In addition to our educational opportunities per se, for a wider public we also organise science conferences, exhibitions, seminars and a weekly colloquium.

Staff

The leadership of the Institute currently comprises: Jean-Michael Florin, Ueli Hurter (both in the Agriculture Section), Johannes Kühl (leader of the Science Section) and Dr. Johannes Wirz (co-ordinator). They represent the Institute jointly or individually by arrangement.

Through regular meetings and colloquia, the tenured staff of the Institute (together with the aforementioned), Torsten Arncken, Dr. Jochen Bockemühl, Renatus Derbridge, Karin Lundsgaard, Therese Jung, Matthias Rang, Ruth Richter and Barbara Schmocker, help share responsibility for running the Institute.



Seed pods of greater celandine

Wild relatives of cultivars for the seed bank

Ruth Richter

Are cultivated medicinal plants still cultivars, even when they occur in the wild? The Swiss Commission for the Conservation of Cultivars (SKEK) answers this in the affirmative, in that it is supporting the project of the association *Hortus Officinarum* which aims to conserve nine medicinal plant species that have been cultivated and bred in Weleda's medicinal plant nursery for years. Any cultivation exposes wild plants to altered environmental conditions. For example, there are usually more nutrients available, better aeration of the soil, regular harvesting and, in biodynamic cultivation, treatment with the preparations. The population adapts itself to these new conditions, and, as a result, types of plants that differ from those at sites in the wild establish themselves. This has created cultivar varieties which, in the field of aromatic and medicinal plants, fit into the programme for conservation and sustainable use of plant genetic resources of cultivars in Switzerland. The economic, ecological and cultural value of the biodiversity of cultivars is recognised in Switzerland by the implementation of a national biodiversity conservation action plan for food and agriculture (NAP) and supported by the Swiss Ministry of Agriculture.

Within this framework, in 2008 and 2009 at Weleda nurseries, and in the gardens of the Goetheanum estate, five indigenous species of wild plants, two adventive species



Medicinal plant cultivation, cotton thistle on the right

and two species accompanying cultivation were cultivated from their own progeny and the seeds were harvested for the national seed bank at Changins. In parallel with this, detailed morphological descriptions and data on the origins were stored in the national data bank, so that future users of the seed will have reference points regarding the expected properties when these plants are cultivated.

The conservation of biodynamic seeds involves selecting plants for seed harvest that best correspond to the needs of the enterprise concerned. In addition to documenting origins, this is a core task of the *Hortus Officinarum* association, which is based at the Goetheanum Research Institute. Furthermore, growers of medicinal plants who are members of the association have access to the seeds of the chosen species which cannot be obtained commercially, or are not available with organic certification. This applies, for example, to annual nettle and scarlet pimpernel, from which, in 2010, we harvested a sufficient quantity of seed to cover the needs of the *Hortus* enterprise.



Rhythmic shape changes in mistletoe berries dependent on constellations of the moon in the zodiac

Renatus Derbridge

In a modest cottage in the village of Strontian (the element Strontium was discovered nearby and named after the place) in the Scottish Highlands, surrounded by wonderful countryside, lived Lawrence Edwards (1913-2004) who, in addition to his job as a biology and mathematics teacher in Edinburgh for 40 years, was engaged in painstaking research on the buds of trees and many other plant species. As part of his work on projective geometry, which he studied with George Adams at the Goetheanum, he was interested in the geometry of the living world. His most important research results are presented in his book *The Vortex of Life*. He made the fascinating discovery that plant buds undergo rhythmic shape changes in winter, a time when formerly they were assumed to be resting. In all the plants he investigated, these shape changes showed a clear connection with positions of the moon and planets, and for each plant species a specific planet.

He was also able to demonstrate that each tree (or wood), assigned by Rudolf Steiner to a specific planet for the seven columns of the first Goetheanum, had a relationship

with their corresponding planets as regards their bud shape rhythms.

People at the Hiscia Institute for Cancer Research in Arlesheim were able to show by means of Edwards' method that mistletoe berries undergo shape changes corresponding to positions of the moon in the zodiac.

This work by S. Baumgartner and H. Flückiger is now taken up, extended and deepened in the context of a research project at the Goetheanum Research Institute (Glashaus) as a cooperation between the Science Section and the Hiscia Institute, supervised by Prof. Dr. H. P. Heusser at the University of Witten/Herdecke.

The aim is to develop Edwards' work, which hitherto has been largely ignored by the scientific world, in order to make it accessible in wider circles, and secondly, to corroborate the evidence of the moon-zodiac effect on mistletoe, and analyse it in detail. The results enable us to determine the divisions in the sky between the zodiacal constellations. By means of the exact shape change in the mistletoe berry correlated with a particular constellation, it is possible empirically to map the spheres of influence onto the sky, allowing us to re-establish our present divisions of the zodiac in a modern way.

The second year of the groundsel project

Inheritance of acquired characters?

Johannes Wirz & Raghav Modh

Raghav Modh is on time for his first sowing in the greenhouse. Between his Bachelor's degree and his studies at McMasters University Medical School, he had six months to collaborate in the groundsel project funded by a grant from the Goetheanum ? with success!

The project was a big challenge as it meant not only becoming familiar with the specific question of the inheritance of acquired characteristics in plants, but also studying the fundamentals of Goethean botany and its epistemological assumptions. As regards



Left: Two plants grown under dry stress conditions (T). Right: For comparison, two plants grown under salt-dry stress conditions (ST).

issues in the specialist field, competent people are present in the Institute on a day-to-day basis. Rudolf Steiner's *Theory of Knowledge Implicit in Goethe's World Conception* was studied in a group with other students in a weekly colloquium. We could all get an idea of how research and theoretical work feels in the School of Spiritual Science.

In these experiments, third and fourth generations of the test plants were grown on in the seven environmental conditions used hitherto, namely light, shade, dry/moist stress, salt-dry/salt-moist stress and controls in partial shade, to offer the plants an opportunity to internalise the capacities needed in order to be able to set seed under such extreme conditions. Furthermore, all variants from the third generation were tested for phenotypic differences by growing them on under uniform conditions. We examined in detail and recorded their developmental dynamics, form, leaves, time of flowering and the number of flowers. The integral gesture of each variant was described. The aim of being able to recognise the growth conditions in the plant form was extraordinarily successful.

The results of growing on under uniform conditions are not yet clear. Although we sometimes found gestures of the test plants reappearing, the variability amongst ten plants from a single class of environmental conditions was by comparison very high. In the meantime, from results either published in specialist journals or in reports from



Two variants grown on in neutral conditions; top: dry stress; bottom: salt-dry stress. The general impression is one of similarities with the form types in S. Here too, ST is more compact than T. The variability of individual plants within the two variants is noticeable though not understood.

colleague plant breeders who have treated seeds with sound intervals or eurythmy, we have learnt that clear effects only occur when the plants are grown on to a second generation. This is a good reason to repeat the experiments with growing on. In addition, the test plants will be taken into their fifth and sixth generation in 2011.

Understanding healing plants

Torsten Arncken

Pomegranate

With Weleda colleagues Jasmin Peschke and Leo Zängerle, I co-authored an article entitled *Ganzheitliche Naturkosmetik mit Granatapfel. Der Zusammenhang von Substanzbildung, Habitus der Pflanze, Mythologie und kosmetischer Wirkung der Pflanzenextrakte als Grundlage ganzheitlicher Produktentwicklung* which was published in April 2010 in SOFW Journal.

In that article we develop the inner connection between the form of the pomegranate, its mythology and the substances it contains, as well as its effects on the human being. We started from observations of characteristics in its form. In pomegranate the flower buds look like ripe fruit. On the other hand, in the ripe fruit clear traces of flowering are still to be seen. Thus there is an interpenetration and overlap of fruiting and flowering impulses.

The picture of the Persephone myth shows how vitality and dying in the natural world, the change between spirit and matter, is freed from rigidity in the pomegranate seed, and transformed into a rhythmic process.

This property of the pomegranate is reflected in its structure and substance composition. In the seed are found the unusually conjugated triene fatty acids. They are very highly developed cosmically and highly sensitive to the earth-forming processes of oxidation. They are surrounded by a liquid containing phenolic substances, which create an environment in which substances are preserved.

In the article we also discuss how these observations immediately harmonise with configuration of the mature human being and how we can deduce from that the application of the plant in body care.



Pomegranate. Left: flower. Right: fruit

Rheum rhaboticum

In a collaboration with J. Maier from Weleda Arlesheim, I carried out a plant observation of *Rheum rhaboticum* for a proven sample and compared it with other species.

VulnodoronTM plants and other projects

In a collaboration with Dr. A. Arendt from Liestal, I studied three plant species for a preparation developed by Rudolf Steiner.

In a further project, I studied the fundamentals of the expression of salt in plant tissue. Plants were treated with various salts and the change in form that resulted was observed. For example, working with Dr. Felix Baur, I smelt the plants and then painted pictures of the scent impressions.

In addition, within the framework of cosmetic development for Weleda, portraits of fourteen plants were produced.

Complementary spectra as self-determining partial phenomena

Phenomenological approaches to spectroscopy and dispersion

Matthias Rang

In his *Theory of Colours*, Goethe described spectral phenomena that arise at light-dark contrasts when looking through a prism. These spectra can look very different depending on the contrast, but they always fulfil one property: if the initial contrast that makes them appear is exactly inverted, the colours that arise in them lie on opposite sides of Goethe's colour circle. This led Goethe to deduce an equivalence of such spectra.

One of the key questions in this project was whether this equivalence can be confirmed with the resources of modern optics. Through a series of experiments, in particular an analysis and generalisation of Newton's *experimentum crucis*, it was possible to show that the equivalence is representable as optical equivalence, and, giving special preference to one of the spectra, as happened with Newton, cannot be justified *purely optically*, but rather as determined by historical circumstances and, because of its consistency with other ideas in physics such as the concept of energy, should be viewed as obvious.

In contrast to this, spectral phenomena show a self-contained symmetry and the same properties between the spectra. In current spectral theory, the symmetry as regards the phenomena is broken by giving special preference to one of the equivalent spectra. Thus, the theory is not false, as it can explain *all* phenomena without contradictions. However, we could regard the lack of symmetry reflection as a kind of 'aesthetic mistake'.

We concluded and published detailed discussion of the aforementioned matters. Further manuscripts are in preparation. The project is now in its application phase and we have already identified several areas of use. The first is a scientific application that, from the above mentioned equivalence, should be of use in measurement technology.



*Left: Making the exhibits in the 'central room' of the 'Glashaus' (Goetheanum Research Institute) which served as an additional workshop during preparation of the exhibition.
Right: a xenon high-pressure lamp-housing newly developed at the Research Institute*

Another is for education in schools in the form of a teaching aid, including handouts and a lesson plan. Lastly we produced public and museum educational material in the form of the exhibition described on page 18. This has successfully made our research findings accessible beyond specialist circles, reaching interested members of the public.

For the exhibition, forty experiments were developed in our Research Institute (*Glashaus*), where we also carried out our own technical implementation, involving the construction of mechanical and optical components and preparing the displays for exhibiting. The aim was to develop modern exhibits which fully exploit the technical optics of today and, as regards both their experimental message and their technical realisation, can be recognised as really new developments.

Experiment FARBE – 200 years of Goethe's Theory of Colours

Matthias Rang

Usually there is not much happening at the Goetheanum in the summer months of June, July and August. But last year at this time, in the West stair well, foyer and first floor there was an exhibition called *Experiment FARBE*. It was accompanied by weekly lectures ? the 'colour talks' as we called them ? together with workshops and conferences (further information is available at www.experimentfarbe.ch, in German only). Occasional visitor counts showed that between five and ten thousand people may have visited.

The exhibition was occasioned by the first publication of Goethe's *Theory of Colours* exactly 200 years previously. Since that time there has been much discussion as to whether Goethe contributed anything significant to colour research.

We developed a plan for the exhibition *Experiment FARBE* that was aimed not so much at presenting Goethe's achievements or the history of the reception of his work, but rather at a *hands-on* introduction of Goethe's ideas and experiments, and thus a revelation of the world of colours through experimentation – this was one of Goethe's main aims too.

The experimental displays were extended and continued in a second section of the exhibition by an artistic deepening of the theme. By focusing on work on the colour circle, and the characteristics of colour composition, this section was directly connected to Goethe's descriptions in the chapters in his *Theory of Colours* entitled 'General Characteristics' and 'Sensory-Moral Effect of Colours'.

Finally, in the third section of the exhibition, we tried to go deeper into the science of spectral colours and colour physics. For this, we developed in the Research Institute completely new experiments, some of which could only be realised at great cost, yet which enabled us to combine modern optical methods with Goethe's ideas. This scientific combination has been developed in recent years (see page 16) and for the first time



Tetrahedral water prism in the West stair well and on the roof terrace of the Goetheanum

it became accessible to a wider public in our exhibition.

The newly developed experiments and further exhibits were shown not just in Dornach. They were a supplementary part of the experimentum crucis event at Humboldt University in Berlin on the occasion of its celebration in the same year of the bicentenary of its foundation. Prof. Dr. Johannes Grebe-Ellis (Leuphana University, Lüneburg), Prof. Dr. Olaf Müller (HU Berlin) and Prof. Dr. Friedrich Steinle (TU Berlin) organised an international workshop there at which we presented and discussed our newly developed experiments (further information: www.experimentum-lucis.de). In addition, at the *Deutschen Farbentag 2010* in Halle, some of the displays were shown together with the *experimentum lucis*.

The entire exhibition *Experiment FARBE*, albeit in modified form, will be shown again between 14 May and 2 October 2011 in Järna, Sweden, together with the objects and large installations of James Turrell, as well as smaller exhibitions of Rudolf Steiner's blackboard drawings and the work of the Swedish painter Hilma af Klint. This big event is called See! Colour! and it will offer many supplementary events. It will undoubtedly be worth a special visit to Sweden (further information at: www.seecolour.se)!

The Experiment FARBE team:

Jasminka Bogdanovic, Johannes Kühl, Nora Löbe, Johannes Onneken & Matthias Rang

'Does the world exist within me? How does reality arise?'

Perception and reflection exercises for developing a capacity for responsibility in daily life

Jochen Bockemühl

This was an exhibition which, with its accompanying booklet, mainly covered plant and landscape pictures with suggestions for exercises in perception and reflection. All of these can prepare a path on which anyone can rediscover their own living connections with what they encounter.

What we experience as reality in the world is not something given *per se*. We normally hardly notice that we are participants in making this reality come about. Are we always conscious of how we naturally regard the things around us ? a rose, an acorn, a loaf, another human being ? looking at each differently according to what lives in them? And as we do so, are we already creating relationships to the initially puzzling perceptions through our way of viewing things? In doing so, is it not we who give



Pictures of landscapes by Jochen Bockemühl as shown at the exhibition

these perceptions a meaningful context? Our attention is already focused on the inner nature of what appears to us. To what extent is this inner nature present in pure sense perception?

The question 'Does the world exist within me?' is important today because at all levels of natural, social and soul-spiritual life we are increasingly freed from our natural connection to life processes. Virtual worlds arise in which more and more we lose our connection with ourselves and with the nature of things. This means we have to recreate that connection ourselves. For this it becomes ever more important to examine these circumstances ourselves and arrange our life accordingly.

The exhibition was shown in the summer of 2010 in Lom (Norway) and in Feuilla (southern France) and, at the time of writing, is on view in Vaihingen (Germany). From February 2011 it is 'free to roam'.

Enquiries to PETRARCA, European Academy for the Culture of Landscape, Laurens Bockemühl, info@petrarca.info, Fax +49 (0)6806 9828677.

A brief report on sensitive crystallisation research

Jean-Georges Barth

This work, which was started a few years ago in the Goetheanum Crystallisation Laboratory, was undertaken on the initiative of the French association ARCADDI (Association pour la recherche sur la cristallisation avec additif; headquarters: 7 rue Vulpian, Paris) and with the financial support of the Goetheanum, Weleda and Software AG Foundation. The aim was to find and investigate the most important parameters of the process. This long and complicated research of a multi-parameter system is now finished. It has enabled us to formulate a summary of some of the general guidelines for the reproducible production of crystals in the presence of additives (sensitive crystallisation).

The air quality (temperature, humidity and flow rate) around crystallisation dishes in the same series should be identical.

In order to achieve this, the dishes containing the crystallisation solutions are placed on an annular table set up centrally in a cylindrical chamber so that the whole system is completely symmetrical.

This chamber is perfused by an air flow with constant humidity and temperature. The flow rate must be exactly determined and controlled.

The degree of dilution of each mixture to be crystallised has to be precisely fixed so that the picture-forming potential of the additive under investigation can be optimally expressed.

When these preconditions are fulfilled, the climatic and crystallographic reproducibility is very satisfactory. Maximal air humidity during the experiment is stable and reproducible and the time of appearance of the first crystal nucleus in the different dishes is the same and reproducible (variation less than 3%). It should be especially emphasised that the spread of crystallographic and morphological results is very narrow. This guarantees good analytical quality. The resolving power of the method is satisfactory. Indeed, 94% of the crystallisation pictures are correctly assigned. The aim



View of the newly developed crystallisation chamber which in turn is housed in a climatic chamber that is thermally and mechanically isolated from the surroundings.

of the research was therefore achieved.

Blood crystallisation laboratory

Birgit Seitz

As in 2009, this year we were again forced to realise that there was a significant cutback in commissions. This led for the first time to a large deficit.

Furthermore, our search for opportunities and ways of renewing the laboratory venture, and especially finding a new co-worker, remained unsuccessful. So shortly before Christmas we decided to close the service. This brought to an end a long tradition at the Sensitive Crystallisation Laboratory. In this situation, we are particularly grateful that we could refer 'our' doctors requesting blood investigations to Mrs. Bornholt. She was trained by Haijo Knijpenga in Dornach and for 12 years has run a la-

boratory for sensitive crystallisation according to Ehrenfried Pfeiffer in Bremen (Address: www.floraapotheke-bremen.de, floraApotheke@gmx.de. Postal address: Flora-Apotheke, Landrat-Christians-Str. 126, 28779 Bremen, Telephone: +49 421 / 601119).

Despite this difficult decision, blood investigation with sensitive crystallisation has not forfeited any interest or fascination. This was clear at our workshop for 'crystallisers' that was held again for the first time in five years. The participants clearly expressed the wish that the Sensitive Crystallisation Laboratory at the Goetheanum should be retained, partly as a central collecting point for information and quasi 'maternal home' of the method, but also partly because people will remain aware that the method is connected with anthroposophy. However, it was also clear at the workshop that participants' methods and the questions they work on are very diverse. This is at first experienced as a difficulty as regards co-operative work. Another meeting is planned for the coming year (2011).

We are thus pleased that the extensive laboratory space will continue to be available for externally funded research projects. This means that projects such as our ongoing study with cow blood that Haijo Knijpenga and Klaus Suppan are conducting at the request of a doctoral candidate, and the basic research of Jean-Georges Barth, can still continue and thus keep open the prospects for the future.

Our next project, for which we are seeking financial support, is aimed at progressing the refurbishment of the archives and supporting Haijo Knijpenga in his work on documentation and organising the demonstration plates and completed studies. If possible we shall publish from that an overview of the blood crystallisation work that has been carried out here at the Goetheanum for the last 40 years.



Evolution and breeding ? a conference at Witzenhausen

Ruth Richter & Johannes Wirz

The conference on 7-9 October 2010 entitled *Life in movement – perspectives for evolution and breeding* was conceived and arranged by a group of colleagues who, in the context of modern biology, have worked for several years on Goethe's idea of the type as further developed by Rudolf Steiner. Ton Baars, professor in biodynamic agriculture at Witzenhausen University, welcomed about 40 participants, many of whom were students.

The broad theme ranged from philosophical and biological presentations, to Darwin's evolutionary theory, and to contributions on animal and plant breeding for organic and biodynamic agriculture. It was clear that the connection between evolution and breeding – already in existence in Darwin's time – is still current today.

The philosopher Günter Altner led with a provocative thesis that evolution is to be conceived not only as an object but also as self-discovery. This implies that in the living world there must be an entity that is present in evolution from the start onwards, but which, in the human being, fully manifests only at the end of a long evolutionary series. According to Johannes Wirz of the Goetheanum Research Institute, this entity is the same as the idea of the type that Goethe described as the 'inner nature'. In the view of most biologists, chance variation and natural selection always assign the living

organism a passive role in evolution. Eva Jablonka, a biologist at Tel Aviv University, showed how the participation of organisms in their evolutionary development has been assigned a mechanistic explanation through modern epigenetics and therefore this participation has regained its place in scientific discussion.

In organic breeding, methods are practised which include an active involvement of the organism in its environment. This was presented in relation to several projects on plant and animal breeding, and was illustrated, by both, work on breeding research, and by results achieved with expertise on farms through staff at the Swiss Institute for Organic Agriculture, as well as lecturers at Wittenhause University.

In the biodynamic movement, the diversity of attempted approaches to breeding, regarded as still at the experimental stage, showed that in this movement especially there is an awareness of the necessity for growers in sustainable agriculture and horticulture to take breeding in hand themselves. In doing this, breeding is regarded as a conversation between the human being and the animal (or plant), and the wellbeing of all parties and their fundamental life requirements has priority. One example presented, that of targeted breeding of indigenous cattle in a grazing economy in Africa, made it clear that people and animals can adapt and survive, even under extremely unfavourable environmental conditions.

At the conference, several qualities were noticeable which genetics, the basic science of modern biology and breeding theory, picks up from approaches by which emphasis of a breeder's view based on experience, aesthetics and intuition has priority. The message was conveyed that in a breeding science that is responsible and fit for the future, both approaches must be combined, because – as the breeder N. I. Vavilov had already remarked in 1913 – breeding is evolution steered by the human being.



The journal *Elemente der Naturwissenschaft* – now in its 46th year

Johannes Wirz

The journal *Elemente der Naturwissenschaft* published by the Science Section at the Goetheanum was founded in 1964 by Jochen Bockemühl and colleagues. Since Georg Maier gave up the job as editor-in-chief in 1992, it has been produced by Johannes Wirz, Birgit Althaler, Barbara Schmocke and Johannes Kühl. The new editorial team has set up a peer review process, as is usual for most specialist journals. The only difference is that the appraisal of papers is not done anonymously.

The range of themes is broad and the list of authors long. Apart from *Jahrbuch für Goetheanismus*, '*Elemente*' is the only other specialist journal that publishes current research findings of Goethean-anthroposophical science. '*Elemente*' appears twice yearly. The journal is a loss making enterprise, which, without support from the Science Section, would not be able to survive. Nevertheless it would be a serious step as regards the authors and some 450 subscribers if we were to give up this almost unique platform that enables publication of Goethean-anthroposophical research. Despite the huge financial cuts at the Goetheanum, which also impact the Research Institute and the

Science Section, we wish to keep '*Elemente*' going. In an act of self sacrifice, from now on the copy-editing and layout services, until recently undertaken on a fee basis by our professional colleagues and friends Birgit Althaler and Georg Iliev, will be taken over by colleagues within the Research Institute. Obviously this will increase the workload in the Science Section and Research Institute. Indeed this extra work will happen at the expense of research projects, or, more probably, it will be compensated for by unpaid overtime. We look forward to better times, and are pleased that we can still supply our readers with interesting and stimulating articles twice a year.

Published books

Johannes Kühl & Matthias Rang

Apart from the two periodicals published by the Natural Science Section at the Goetheanum – the *Jahrbuch für Goetheanismus* and *Elemente der Naturwissenschaft* – we have produced two books on the theme of colour. One was published by the Goetheanum Publishing Company for the exhibition *Experiment FARBE* (see page 18) under the same title. Because it contains several articles, it is more than just an exhibition catalogue. To our great satisfaction it has almost sold out within a few months.

We have also produced a book entitled *Höfe – Regenbögen – Dämmerung*. This is an introduction to Goethe's *Theory of Colours* by Johannes Kühl. At the time of writing, the manuscript is with the Verlag Freies Geistesleben and will soon be published by them. Colours can arise under various types of physical conditions. All possible types of conditions can be found in the atmosphere, so this allows a comprehensive introduction into the whole field to be presented.

Discussions – working with the public and with the Section

Travel ? international activities in the Science Section

Johannes Kühl

In 2010 there was a series of small weekend events and travel abroad involving lectures and discussions in the localities visited.

In February I attended the meeting in England of the United Kingdom group of the Science Section. This was connected with a science conference. In March I accompanied Bodo von Plato to the annual conference of the Anthroposophical Society in France. In April I joined a course in Poland (Gdynia) on colour which was organised for the Anthroposophical Society by Ewa and Michael Wasniewska.

September found me in an interesting place in Norway about an hour's drive north of Oslo where there is a disused astronomical observatory (mainly a sun observatory, but which also has a small radio telescope and an amateur telescope) which the Norwegian State handed over to the former Waldorf teacher Turid N?ss to establish a kind of cultural centre. There we led a conference for Scandinavian teachers on science teaching in the upper classes of Waldorf-Rudolf Steiner Schools. The work with colleagues, the wonderful landscape, and especially the observatory equipment, made for a very enriching and interesting visit. From there I went to the conference on *Theory of Colours* at Humboldt University in Berlin (see *Anthroposophie Weltweit* Nov. 2010). From there I travelled on to Lübeck where I worked with Upper School pupils and parents on issues connected with science in schools.

It was a particularly rich experience to again have the opportunity again of a fortnight in November visiting various places in the USA. The first was a visit to the Anthroposophical Society in Ann Arbor. From there I travelled to a conference of the North American Group of the Science Section in Chicago. The theme there was 'horns and antlers', as well as general metamorphosis, the basis of which was the recently published book by Andreas Suchantke *Metamorphosis – Evolution in Action*. I gave contributions on the Class Lesson that we were working on at the meeting. After that I visited our good



Thomas Schmidt and Albrecht Schad briefly setting in motion the coelostat of the former sun observatory at Harestuna during the teacher training course

friends Henrike and Craig Holdrege and Steve Talbott at the Nature Institute in Harlemville. The brief time there was filled with a lecture (Goethe and the origin of holistic science) and many conversations. After a short visit from friends in Spring Valley, I went to Los Angeles where a weekend on the atmospheric colours was organised by the Anthroposophical Society. The work, and meeting people, was an incredibly rich experience!

Agriculture Section

Jean Michel Florin & Ueli Hurter

Our section has acquired a new leadership. Nikolai Fuchs resigned as leader in June. From August, Jean-Michel Florin from France, Ueli Hurter from Switzerland, and Thomas Lüthi from Sweden took over the joint leadership of the Section. The work is part-time for all three and they are still working in their original fields.

The big project, and the most important job for the new leadership, was preparation for the 2011 conference whose theme is *Zukunftswerkstatt Landwirtschaft, von Brennpunkten zu Leuchtpunkten*. The aim of this conference is not to determine its content from the outset but to give priority to the methods. 'Werkstatt' (workshop) in this context means that it is primarily a 'processual' conference. All participants and the entire conference community go through a process. You will not be the same person at the end of this conference as you were before it. Each person will bring the burning issues from their everyday work in biodynamics. The potential for the future is actually hidden in the problems faced, but the real question is whether people will become aware of this. To arrive at this 'shaping out of the future', Claus Otto Scharmer and Nicanor Perlas ? who will be leading the work in the 'future-laboratories' ? have each developed methods for a group to find its way step by step through dialogue from old, dead forms to new, burgeoning forms. The interesting thing about this is that we will not search for the solution outside ourselves, in some imagined better world. Indeed, a future, whether for the matter in hand or for oneself, is only possible through personal connection with the situation. This change in the way of looking at things is not created by oneself alone. Dialogue with another person, with the 'thou', enables someone to discover the shape of their own future. The other person also discovers their future ? and thus both gain their common future. We hope the conference will create an array of ten to fifteen impulses for the future of the biodynamic movement, and that actively shaping the future will become a striking feature of our movement.

The conference is a research conference in the way described. We – and indeed each participant – will actively try to research our future, and, through our engagement, make



it manifest in the world. This research approach – action research in the sociological sense – seems to us appropriate for the field of agriculture. For, instead of confronting a nature-world that is given, we as farmers shape our world. Furthermore, we actually live and work in the world of the farm that we want to study. Thus we are seeking new ways – beyond traditional science – of studying the life of the farm as an agro-social phenomenon. The goal is not objective description from without, but a basis for action in order to deliberately form the future from within, through the persons affected.

Research projects

In the first half of 2010, Sylvia Zuur's grant funded project on the so-called Handlungslücke and the part-time project on organismic economics with Katja Reichenbacher (document downloadable on our web site, see page 37) took place. Silvia Zuur's project was concluded with several publications and the organismic economics project was provisionally concluded with a colloquium on 28 May at the Goetheanum in which farmers participated.

The full length Annual Report of the Agriculture Section is available to order or can be viewed on the Internet.

And to conclude...

we should like to express our warm thanks to all those who have enabled and supported our work:

The members of the Anthroposophical Society receive first mention. Through their membership contributions about one third of our income, as well as the costs of the Institute infrastructure, are covered.

Then there is a list of private donors, who, through smaller or larger contributions, have supported our work. We should like to thank them very warmly too.

Finally, a number of companies and foundations have contributed to funding individual projects, some decisively for the projects concerned. The list is as follows:

- Bildungswerk Beruf und Umwelt, Kassel
- Biogros, Luzern-Munsbach
- Boesner GmbH, Unterentfelden
- Damus e.V., Karlsruhe
- Evidenzgesellschaft, Arlesheim
- Fondation La Bruyère Blanche, Vaduz
- FondsGoetheanum, Dornach
- Förderverein für Goetheanistische Farbenlehre, Basel
- GLS Treuhand, Bochum
- Hans Stockmar GmbH + Co. KG, Kaltenkirchen
- Humanus Stiftung, Basel
- Mahle-Stiftung, Stuttgart
- Osram GmbH, München
- Rogau Stiftung, Dreieich
- Rudolf Steiner Fonds, Nürnberg
- Schott AG, Mainz
- Verein Hofbergli, Rehetobel

- Verein Hortus officinarum, Rheinau
- Verein Freundeskreis der Sektion für Landwirtschaft
- Verein zur Förderung anthroposophischer Institutionen, Zug
- Wala Heilmittel GmbH, Bad Boll
- Weleda AG, Arlesheim
- Carl Zeiss Jena GmbH, Standort Oberkochen
- Zukunftsstiftung Landwirtschaft, Bochum

We should like to convey a warm thank you to all of them.

2010 budget for the Science Section

Expenditure (in CHF):	Income (in CHF):
Staff 653.000	General Anthroposophical Society 306.000
Administration 15.000	Sums for specific purposes 343.000
Travel 12.000	Sales, services 94.000
Conferences, courses 30.000	Conferences, courses, 20.000
Publications 26.000	Publications 13.000
Production, materials 40.000	
Total: 776.000	Total: 776.000

2010 budget for the Agriculture Section

Expenditure (in CHF):	Income (in CHF):
Staff 300.000	General Anthroposophical Society 142.000
Administration 24.000	Sums for specific purposes 104.500
Travel 4.000	Sales, services 2.000
Conferences, courses 68.000	Conferences, courses, 153.500
Publications 3.500	Publications 3.500
Production, materials 6.000	
Total: 405.500	Total: 405.500

Our needs...

We have serious concerns about the future of our Institute and would like to share these concerns here. We regard it as still necessary that research can be carried out at the Goetheanum. If one considers that the basic contribution from the Goetheanum is supposed to carry all the work of the Science Section and of its leader, it becomes clear that the work at the Institute is almost completely made up from project funding, which has to be re-applied for annually. Therefore we are urgently looking further afield for ways that allow us to act more freely, for example to be able to invite a scientist for a period of work at the Institute, or bridge the period between projects, or even for once pursue themes which seem important, without immediately having to write a project grant application.

Moreover, in the field of Goethean science it is very important to give courses and offer educational programmes. Science may be one of the most important pillars of a free, non-ideological understanding of anthroposophy, but this applies only if it is sufficiently methodologically examined and 'reading in the book of nature' is practised. In the coming year we shall increase our efforts in this direction, but we are well aware that it takes time and money.

On account of the precarious financial situation at the Goetheanum, in 2011 we will have our core funding cut again. Normally, private institutes have a fixed basic income of about 50%. In recent years we have not been able to achieve this, and in 2011 it will be about 75,000 Swiss francs less than in 2010. The Institute's survival is endangered. Thus we need to find new means if we wish to retain science research at the Goetheanum. First of all we are trying to increase project support through external funding. This may work in the short-term, but in the medium term the conditions for obtaining outside funding are deteriorating because in future it will be almost impossible for us to demonstrate that we have match funding. In addition, we will ourselves take over the production of *Elemente der Naturwissenschaft* which was formerly carried out externally. This will use up time otherwise devoted to working on research issues. It is also not clear whether the Science Section Leader can continue to the same extent with

general duties in the Goetheanum. Furthermore, we have had to withdraw the blood crystallisation service because it was not covering its costs. In order to find a long term solution to this acute problem, we are in the process of discussions as to whether we can improve our financial basis with the help of partners, so that the General Anthroposophical Society no longer has sole responsibility for supporting the Institute.

For the above reasons, we should be grateful for any support. Especially helpful to us with our work are regular donations of whatever amount. If you have any questions on this please feel free to contact Barbara Schmocker or Johannes Kühl (see page 40). We will gladly send you additional copies of this report to pass on to friends and acquaintances.

Johannes Kühl & Johannes Wirz

Addresses, Internet etc.

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For the theme of landscape see: <http://www.petrarca.info>

For work with bees see: <http://www.mellifera.de>

Bank account:: Konto Allgemeine Anthroposophische Gesellschaft
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Account number: 10060.71, Sort code: 80939
IBAN code: CH36 8093 9000 0010 0607 1/CHF
BIC code: RAIFCH22

Important: Payment codes:

NWS 1100 for income for the Science Section,
SL 1150 for income for the Agriculture Section.

Our web sites

Natural Science Section – <http://science.goetheanum.org/>
Agriculture Section – <http://www.sektion-landwirtschaft.org>

On these sites further information and material is available as follows:

- a detailed list of publications of colleagues since 2000
- up-to-date information on our conferences and seminars and the programme of the Institute's public colloquia

- research reports and texts for download
- bibliography of Goethean science published by Erwin Haas (as PDF file, searchable and printable at high quality)
- author index and abstracts from *Elemente der Naturwissenschaft*
- links to other Institutes and information on their events.

Die Elemente der Naturwissenschaft

The Science Section publishes *Elemente der Naturwissenschaft* with contributions from all areas of natural science and picture forming methods. The issues appear twice yearly.

Editorial team: Johannes Wirz (Editor-in-chief), Johannes Kühl, Barbara Schmocker

Editorial address and subscription orders::

Naturwissenschaftliche Sektion am Goetheanum

Elemente der Naturwissenschaft

Postfach, CH-4143 Dornach 1

A sample copy is available on request. Enquiries to the Institute Secretariat (Barbara Schmocker, see page 37) or via science@goetheanum.ch.

Staff changes at the Institute

The most drastic 'staff change' in the last year is of course the departure of Nicolai Fuchs. In addition we have lost two visiting students, Silvia Zuur and Raghav Modh. The two new leaders of the Agriculture Section, Jean-Michel Florin and Ueli Hurter have begun work. From conversations so far, it is already clear that this change will bring a new impulse to the work. On the one hand, it will involve more 'action research' with Ueli Hurter, i.e. research work with directly participating farmers, and on the other hand more educational work with Jean-Michel Florin.

Renatus Derbidge has begun a project on shape changes in mistletoe berries (see page 10). This has brought us into closer collaboration with the Association for Cancer Research (Hiscia) in Arlesheim. We look forward to seeing what developments our new staff line-up brings!



Institute staff at the entrance to the Glashaus (Jean-Michel Florin and Ueli Hurter not present)

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Recent publications by co-workers at the Institute

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- [19] Richter, Ruth (2010): Vereinigung der Gegensätze / Kolloquienreihe am Forschungsinstitut. In: Das Goetheanum 45, S. 11.
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- [22] Richter, Ruth (2010): Serie Heilpflanzen in der Frauenheilkunde, Teil 1-3: Nr. 4 Der Frauenschleier, S. 41f.; Nr. 5 Die Schafgarbe, S. 41f.; Nr. 6 Der Mönchspfeffer S. 41f.; In: Freude am Garten, Rubrik Kräuterheilkunde.
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- [29] Wirz, Johannes (2010): Ein Hoffnungsschimmer. Das Goetheanum 49, S. 2.
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A detailed list of all publications by the Institute's co-workers since 2000 can be viewed on our web sites. The web addresses are on page 37.