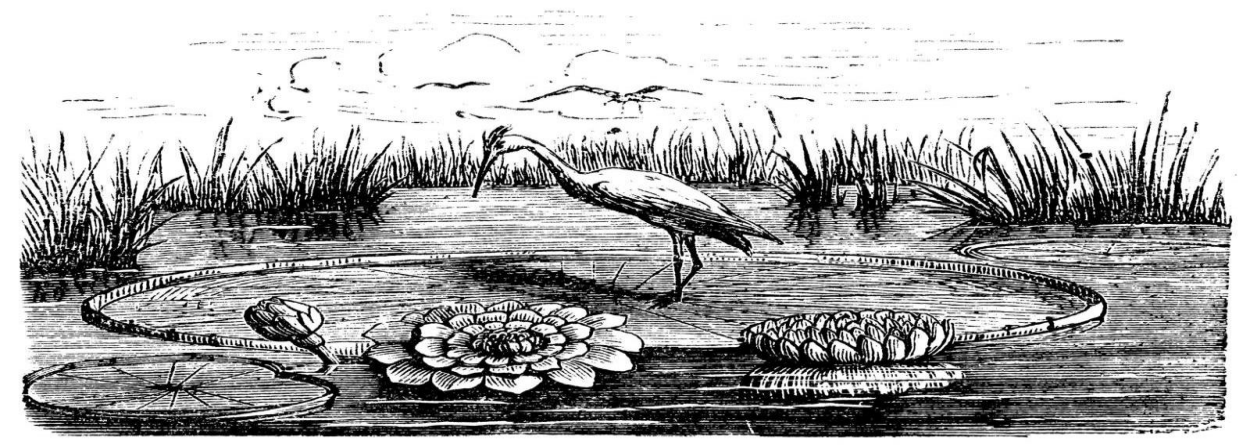
NATURA

Illustrated Newsletter of the Natural Science and Mathematics Group of the AS of GB

Spring 2023



Contents

Poetry/Song

The little brown bulb lies quiet and warm,
Sheltered from wind and sheltered from storm.
"Awake, Little Bulb," call the rain and the sun,
"Wake and unfold
Your green and your gold,
For winter is done."

Forthcoming Meetings & Events

Free Energy in the City of Brotherly Love?
A talk and discussion on 20th March 2023, 12.30 – 2pm in the Crescent Arts Centre, Belfast, as part of the *Imagine Belfast* festival of ideas and politics. £3/£2 Concessions
Presented by Malin Starrett

The talk will explore some aspects of the work of the 19th century Philadelphia inventor John Keely and his claims to have discovered a new force to power machines. The Keely Motor affair draws in multiple diverse strands – science, technology, commerce and western spirituality. There is also a local dimension for N. Ireland in that a large Belfast company and a Belfast clergyman got involved in promoting Keely's endeavours in the U.S.

Booking through *Imagine Belfast*
festival website: imaginebelfast.com
For further details, telephone
Malin Starrett on 0044 (0)28 20730628

What is water? What is life?
A simple exploration of their nature and connections through direct sensory observation.

Friday 14th April 4 pm – Sunday 16 th , 12 noon.

The Garden Room, Old Mill House, Chalford GL6 8NX

In this workshop we will do many experiments together, both in containers and in open water. These will be arranged to reveal water's amazing capacity to form itself in movement. This behaviour of water can be seen to be life-like, and many find it intriguing and enigmatic. We will hold back from theorising as much as possible and let the wondering guide us. Observing also the structure of seashells and other natural forms – we can ask if we can see Ideas at work which relate the forms of flow to the way living organisms form themselves.

Insights we gain may help us to work with water in horticulture and agriculture, may inspire artistic work as well as possibly provide a sense of the unity in the life realm.

Cost including vegetarian meals £175 (some concessions may be possible)

Limited places, please book early simon.charter@live.co.uk 01453 882114

For more background see www.flowoflife.org

Led by Simon Charter.

Reports

Report on the Conference "Dancing with Polarities – The Human Being Between Nature and Technology" 6th – 9th October 2022 at the Goetheanum

Focusing on technology is something of a new development for the Natural Science Section in recent years. There are various reasons for the previous lack of activity in this area, but at least more effort is being made now to address the multiple significances of technology in our lives. The organisers had something of a tricky balance to strike – to explore some urgent issues relating to digital electronic technology but at the same time to welcome and cater for the many people in anthroposophical circles who work with Goethean approaches to studying nature. Basically, the Conference was a bit of a mix between Goethean nature studies and exploring digital technology.

A good test of seriousness for any conference concerned with the effects of digital electronic technology is to ask: Is this technology being used within the Conference itself? If so, how consciously is it being utilised? Descriptions of the keynote lectures and short biographies of the lecturers were posted online before the Conference, along with brief descriptions of the 'project presentations' that some participants had submitted (on invitation) to bring to the event. Booking for the Conference was also online.

When the people had gathered for the Conference, most (maybe all) of the keynote lectures involved computer-controlled projections, these keynote lectures were recorded on video, a wireless system for distributing the simultaneous translation was used and there were no requests or instructions to switch off mobile phones. This scenario led to at least one humorous and revealing episode whereby a teenage young person in charge of the video camera (recording a keynote lecture) was seen to be playing on his smartphone at the back of the hall. An adult organiser, in the audience, gesticulated in the direction of this young person to admonish him to 'cease and desist' from playing on the smartphone but to no avail – when this didn't work, she copper-fastened the defeat by sending him a message from her own smartphone – presumably, to tell him to stop using his!

To be fair, it looks like the Natural Science Section at the Goetheanum is displaying some restraint as regards the ever-creeping temptation to utilise the internet more and more. This year, the keynote lectures were not 'streamed' live on the internet (they were in 2021) and thus far, the recorded keynote lectures have not been placed online. This represents a welcome display of moderation from those in the Natural Science Section.

The present author did watch and listen online to some of the keynote talks remotely, in N. Ireland, of the Conference last year and one of the lecturers was laudably aware of the hazards of 'broadcasting' the talk to unknown viewers/listeners on the internet. In that particular talk, in 2021, the present author noted that all books referred to by the lecturer were not named by title, but for those physically present at the event, they were invited to go up at the end of the talk to obtain the book titles on a printed reading list. It was also noticeable that the lecturer was being particularly guarded in discussing some areas, even substantially down-playing achievements in anthroposophically oriented science research. The caution and discernment of this lecturer showed a wisdom regarding the use of online access to such events, but it does also raise this central question: What is the point of streaming a talk on the internet (or recording it to be made available online afterwards) if the content needs to be substantially edited and modified in case some distant anonymous individual or group might misuse the knowledge? Those physically present at the 2021 meeting got less than they otherwise would have if online access had *not* been used and those far away, watching online, got much less than a complete picture.

Here is a brief overview of some of the keynote lectures at the Conference this year:
Vesna Forstneric Lesjak gave a talk about research techniques in searching for medicinal properties of plants – seeking to make medicines which include not only chemical substances, but also life processes.
Uwe Buermann and Andrew Linnell were placed back-to-back, each with 45 min. presentations, giving outlines of digital electronic technology, its effects on us and possible counterbalancing forces. The present author got the impression that such a 'back-to-back' format of two lecturers speaking on similar themes can be problematic in that many audience members tend to pick one 'favourite' speaker and therefore do not give due attention to the other speaker's content. It was notable that neither speaker recommended or promoted the idea that we all (as adults) need to regulate and moderate our usage of these technologies. Can young people be expected to show restraint if the adults can't lead by good example?
The back-to-back agriculture themed keynote lectures saw *Martin von Mackensen and Tom Saat* working more together (both speaking German), the former giving a view of various polarities involved in agriculture, while Tom Saat made a provocative case for utilising satellite navigation technology for driving his tractors and stating that he sees his vegetables as simply 'product'. He described his personal involvement with biodynamics as coming in the making of compost and the stirring of preparations, although he did also mention that drones could possibly be used to spray the BD preparations! He was admirably honest about where he is presently at in attempting to work biodynamically. However, on questioning from the audience, he didn't seem to have considered that the plans for digital electronic technology in agriculture go much further. He may currently appreciate the automated tractor guidance using the small 'constellation' of Global Positioning System satellites, but what if tens of thousands of 5G satellites are launched (over 3000 already in orbit), irradiating every part of the earth with microwave radiation? Can delicate cosmic forces still reach us with integrity through a blanket of microwaves? The present author notes a dismaying tendency amongst biodynamic farmers – also seen many times in Ireland and GB - to be swooned by every new development in electronic communications and computer technology, even though the same BD farmers still retain strong critical faculties with regard to chemical and biological interventions in agriculture.

The full days of the Conference (8.30am to 9.30pm) also consisted of practical workshops, short 'project presentations' brought by various participants and what were called 'Immersive Experiences' in the evening – which involved blindfolded walks with elements of music, storytelling, theatre and even a little clay modelling. The dreaminess of such 'Immersive Experiences' might have been better placed in a post-lunch time of day and not early in the evening.

The present author felt it a privilege to be able to go back to the Goetheanum[1] after about twenty years away and particularly because he was able to give a short presentation in the Glasshouse building almost exactly 100 years after a major controversy in anthroposophically oriented natural science had started there. Basically, in 1922, a visitor from London, V. C. Bennie, challenged the results stated by Steiner regarding the coloured shadows experiment described in the Seventh Lecture of the *Light-Course*. This led to two evenings of experiments with the phenomenon of coloured shadows in the Glasshouse building, attended by a small number of people. A kind of contest of authority took place between Steiner and V.C. Bennie, who worked in the Physics department of a London university. The after-effects of the scientific controversy which began there in autumn 1922 have undermined the development of anthroposophically oriented natural science for a century. The present author attempted to bring some new understanding to that controversy, describing a way to recognise the validity of both of the opposing viewpoints. The debate then becomes not so much arguing over who was 'correct' or 'mistaken', but more future oriented – Can we find new ways to study this phenomenon, to gain greater insight?

Malin Starrett Tel.: 0044 (0)28 20730628

Report on The Science Group Annual General Meeting 2022

We met in November at the Field Centre and shared experiences and presentations around geological and prehistroric themes as these had spontaneously converged towards our annual November meeting.

1. A Deeper Consideration of Goethe's Essay on Granite. Maarten Ekema
2. A Goethean Study of Pink Peglamite from the Malvern Hills. Adrian Lamont. Some of the group participated in a field trip to the Malverns on Sunday.
3. Questions on Early Earth Formation- Geology of the Barberton Greenstone Belt and Steiner's Imaginations. William Steffen.
4. What is a Plesiosaur? Dr Judyth Sassoon.
5. Recovering the Hidden Context of World History. This included a look at alternative theories: continental subduction or the expansion of the Earth. Victor Morrow.

It is hoped that all these interesting presentations will lead to articles for our newsletter or website I am not able to provide summaries at the moment, but it was pleasing how a consistent theme had arisen around our Imaginations of the evolution of the Earth and its biosphere and how this is connected to modern scientific work and discoveries. The recurring discussion in Anthroposophical circles about the validity and possible limitations of Radioactive Dating techniques was discussed . All together we were encouraged to be aware of the new context for spiritual-scientific presentations since Rudolf Steiner was lecturing , and to remain open to different ways of Imagining earlier epochs and events on our planet. We need attentiveness to inspire a true evolutionary picture.

A further evening and morning were arranged at the Field Centre during Advent to follow up some of these themes and also with Judyth to look open-mindedly and empathically at Hominid evolution using accurate plaster casts from preserved specimens.

In addition, we shared recollections and appreciation for the work of Wolgang Schad and Alan Hall who both crossed the threshold in recent weeks.

Dr Troy Vine introduced the recent publication *Seeing Colour* (Floris Books) which is an echo and extension of the 2018 Colour Exhibition in the Glass House Stourbridge.

[1] With many thanks to the Natural Science Section at the Goetheanum and the Goetheanum Trust Fund in G.B. for generous assistance in helping with the considerable financial costs of going to a conference in Dornach.

The Business side of the meeting included reports from further afield and a financial statement. Gratitude was expressed to Maarten Ekema for his continuing work on the group website. It is now easier to access a range of articles on different themes. We encourage members to send in links, reports and articles to make our useful archive also a living resource to support our working together.

I would like to add here a few thoughts that arose in me towards the end of 2022 which are certainly connected with the strivings of our Science Group in whatever fields of study we specialise in.

I reread the Origins of Natural Science Lecture Course by Rudolf Steiner partly because we were passing through 100 years since this was given December 24th 1922 to January 6th 2023. My edition has an introduction by Owen Barfield and a fairly thorough set of accompanying notes which support with biographical summaries Steiner's survey of the History and Evolution of Science.

I appreciated the carefully reasoned tone of the lectures reminiscent of that in all the scientific lecture courses given by Rudolf Steiner. Then I became aware of the other lecture courses going on at that time with different groups of people. A course on Spiritual Communion began on 23rd December, another on the 27th on Health and Illness. In the first of these a lecture on the Relationship of the Movement for Religious Renewal and the Anthroposophical Movement was given on 30th December.; and then on New Years Eve a magnificent lecture on the Reversed Cultus. Shortly after there followed the tragedy of the Burning of the First Goetheanum. On New Years day, Rudolf Steiner continued with the course on the Origins of Natural Science.

Becoming aware of the intensive context gave extra weight to my reading of the course on the evolution of scientific consciousness. In lecture IV (27th December) Rudolf Steiner earnestly calls for a " healthy discussion concerning the relationship between anthroposophy and science within our movement". "Anything that goes wrong in this respect can only do grave harm to anthroposophy and should be avoided." Something similar was reiterated three days later regarding the relationship to the Movement for Religious Renewal.

He does not want an opposition to Science within the Anthroposophical movement and repeatedly says that he is describing science and not criticising it. All together here is an attempt to show how Natural Science in the form of our separation from the environment had to evolve, is an integral part of our modern consciousness and especially our capacity for freedom. He does however make the case that Natural science is not suited in its present form for an understanding of the human being, and has to develop Goethe's method further to begin to comprehend Life beyond the inanimate world of Physics and Physiology.

As in all his historical written works Steiner only modestly refers to his own contribution. He mentions his two attempts to revitalise epistemology firstly in the Philosophy of Freedom and then in the 1911 Philosophical Congress in Bologna.

"History can only be understood if we comprehend the further course of things, not in a superstitious or prophetic sense, but by beginning now to do the right thing" "An epoch that has begun must find a way to continue" "Spiritual Scientific research will meet the historic requirements of Natural Science. "

I was reminded fondly of the Evolving Science initiative of our colleagues in Dornach, and also that the Christianising of science is one of the most important needs of our time. He lays out the challenge to develop Chemistry, Psychology and Pneumatology.

I suppose all of us can be aware of what has been achieved in these intervening one hundred years and what also needs renewed efforts and continuous striving.

Alexander Murrell January 6th 2023

Report on Colour Workshop at Ruskin Mill 21/1/2023 with Matthias Rang, Troy Vine, Nora Loebe and Hazel Adams

The day started with a presentation by Matthias Rang. ***How real are coloured shadows?*** We saw how, using 2 projectors with coloured filters, we could observe what appeared to be shadows coloured with a particular colour even though no light with that colour was being used .There was a projector with the complimentary coloured filter a sheet of coloured card creating the shadow and a natural brightness from another projector.

In earlier experiments done with Rudolf Steiner present tubes to look at the shadow to cut out the coloured surroundings which would lead the eye to adapt. There has been controversy ever since, as it was reported that the shadow still appeared coloured. What exactly did Steiner say, and is this colour objectively true?
It is a very strong and immediate experience which certainly encourages us to think this Matthias showed how though it was indeed our eye which gives the judgement yellow as it is adding what is missing to give the universal wholeness of both the colour and the complimentary in balance. So one can see that the subjective response of the eye gives an objective judgement. We do need to follow Goethe and take the eye as part of the experiment. It is a normalising process which cameras now always do, in the Newtonian view the zero point one uses to normalise is darkness, blackness.

Troy Vine followed with ***' Newton and Goethe as founders of holistic science"*** He gave a full and clear presentation of how Newton did his prism experiments, and how Goethe followed on going further with many variations . Troy showed how Newton was also a phenomenologist and rejected the thought that his colour theory was hypothetical, as was suggested in his time and has been assumed by many since then. He was also seeking to find the working of the general principle in the phenomena as his senses presented it and believed he had done that. He believed that the theory was of necessity true as with mathematical theorems. However, since Francis Bacon reductionism had been emerging and Newton concluded that the colour was only "in the light". He had a method of analysis followed by synthesis. Troy showed us how if he had been true to his method but gone further making more comparative experiments he might have come to a fuller understanding. Goethe had studied the forms of plants and his thinking was more fluid, he showed how one spectrum emerges out of the light and another spectrum emerges out of the darkness. He did not follow analysis and synthesis in a Cartesian /reductionist way but could say "all fact is already theory, let us not seek for something behind the phenomena" We need to allow the method to show us how to think.
It was again heartening to be able to relate Newton and Goethe in one picture and see that there need be no conflict within this.

Nora Loebe is an artist and educator and led us ***Exploring the relationships between colours.*** She quoted a 7-year old who, when asked if colour was important, had said to her "colour makes the world beautiful". We thought of how and when we had experienced colourless worlds and noted that even the blind can sense colour. However, without any variation and only say majenta light is allowed to fill a space it will become grey. If then, normal light is allowed to enter the emergence of the complimentary colour can be very moving. Nora showed some wonderful effects with dichroic glass and how changing the angle of the glass in relationship to the light gently shifted the colour appearing through it between magenta and blue and magenta and orange.
Nora then showed how polarised light can give incredible colours in conjunction with thin films (folded cellophane) It was notable how harmonious these colours were yet embodied many complimentaries.
Nora's enthusiasm was contagious and I believe the painters in many of us were stirred up.
One important aspect that came up in discussion was that different colourings in the lights we use can be good for different activities; the bluey LED lights help with clear thinking and sharp judgements, but he the warmer tungsten is better for the more dreamy and metabolic activity (e.g. in a kindergarten).

Hazel gave the last presentation describing the ***Metal, Colour, Light Therapy*** and the encouraging results it is achieving in therapeutic work and special education.
Hazel shared her sense of how important the soul is for our earth lives and how the colours can bring such a richness of soul experience, and also how this works into the life body.

Following Marianne Altmaier Hazel has developed an understanding of how the windows of the first Goetheanum form a path of therapy, this ties in with the 7 metals which are fundamental in Anthroposophic medicine
This therapy is a more passive treatment where one sits in a reclining chair and can bathe in light shining through a window sized panel of coloured glass. This is less challenging than art therapy with colour but can help with the isolation many of us experience by connecting to the peripheral planetary influences. There are common experiences which have been identified with different coloured lights and their associated metals. Hazel described the conditions which can be helped with these.
The approach is being cultivated at Grace Garden school in Bristol.

This was a Field centre event and it certainly encouraged the researchers in us.

A quotation from the physicist Richard Feynman was shared at the end:

"I would rather have questions that can't be answered than answers that can't be questioned."

What is the Natural Science section doing sending balloons up from the Goetheanum?

Matthias Rang gave a talk at the Field Centre on the 20th January 2023 exploring what he called the *window/ mirror* phenomenon in relation to climate changes.
Matthias is a physicist and has been instrumental in creating the Colour exhibition which came to Stourbridge in 2018 and subsequent publications; bringing together Newtonian and Goethean approaches. This work has culminated in the book "Seeing Colour" just published by Floris and officially launched at this event. It has been collaboratively produced by Matthias, Nora Lobe and Troy Vine with the help of Ruskin Mill Trust and will be reviewed soon, I hope.
As well as being co-leader of the section Matthias is an active researcher and has now broadened this research from colour, as we discovered in the talk. To begin with he described the enveloping nature of the elements of the Earth; the solid matter being like a crusty skin around the molten core. The water element is like a life filled layer with the vast oceans, the wateriness of the plant world and moisture in the atmosphere (all known to be seen from space as the blue, green and white swirling around the globe). The air cloak is possibly the most obvious enveloping sheath, thicker near the surface and getting finer further away. Can one also imagine a warmth sheath around the earth? There are layers of warmth it seems and they are in movement as the earth receives warmth from the Sun, radiates it out again but then it is reflected back down from the atmosphere in subtle ways. It permeates the other sheaths with its movements. We were reminded how this corresponds to the way Rudolf Steiner suggested one can think of the human being; as an earthly being with a physical organism, but also with water, air and warmth organisms.
Next Matthias showed a picture of a bright Swiss landscape; a still lake lay in a valley with hills rising either side and a towering sunlit mountain behind. The lake mirrored the mountain beautifully but one could also see the rocks on the lake bed under the clear water through the window of the surface. With further images showing a person standing between still water and the landscape behind one could see how the mirroring takes you to an effective viewing point under the water surface. The window/mirror became a more intriguing idea allowing us to move in our imagination.
Then Matthias described how air can make a mirror for light. This can sometimes be seen in Arctic regions - one sees the sun actually shining over the horizon before it should have risen, and sees it still there after it should have set. This is called the Nowaya-Semlya effect after the Russian islands where it was first seen in 1597. The layers of air create an upside-down mirror reflecting the sun, which is below the horizon. We are more familiar with mirages, the mirroring we can see over hot ground espe-

cially black tarmac on hot sunny days. Both effects depend on temperature differences in the layers of air affecting the way it interacts with light (changing what is called the refractive index of the medium).

Another mirroring of the air with its dust and its clouds has resulted in a phenomenon called global dimming i.e. a reduction in the radiation being received from the cosmos including sunlight, the strength of this radiation rate was falling strongly until 1990 and less so since then. This affects both light and warmth at the surface of the earth

What about the warmth sheath? This is where the balloon comes in. A meteorological balloon was kitted up with instrumentation to measure and record the following factors: water content of the air, temperature, and the amount of heat radiating up from the earth and the amount reflected back down from the atmosphere above. It was to be sent up from the Goetheanum at sunset (so as not to be influenced by direct sunlight), to rise up into the stratosphere to over 30,000 metres (almost 20 miles), it would burst due to the reduced pressure at that height, and drop back to earth a few miles away. It had a GPS tracking device so it could be found again provided it did not fall into a ravine or a lake. The balloon was released and disappeared into the sky. However, it could not be located the next day where it should have landed given the winds etc. It was assumed to have been lost in some way as this does happen occasionally to such balloons. A little later a signal was received from the tracker appearing to show it over a hundred kilometres away in a most unlikely location. This could have been a malfunction in the equipment but they set off to find it anyway and having been blessed by a wonderful double rainbow on the way did eventually locate it at this distant place. Study of the recorded data revealed a very long looping path suggesting it failed to pop as predicted so drifted in the stratosphere for a long time before popping and returning to earth. In this way it also collected much more information than would have been expected.

The data showed various things one would not expect with temperature change and humidity jumping at particular altitudes. This may indicate that there is a window/mirror phenomenon present here in the warmth sheath of the earth organism.

The title of the talk was *Greenhouse or Mirror with Window? An Optical Approach to Understanding the Earth's Atmosphere.* However, it struck me that Matthias had begun to put real substance into the idea of the earth as a being, an idea that emerged into the wider consciousness as the Gaia Hypothesis with James Lovelock in the 70s. I feel we need no longer call this a hypothesis. With such work we can show it as an observable idea - the Earth as a living organism.

Simon Charter Jan 2023

Remembering the work and life of Wolfgang Schad.

The German evolutionary biologist, anthroposophist and Goetheanist Wolfgang Schad (1935-2022) was one of my most significant teachers, and probably for many others as well. He belongs to the generation of Goetheanists who encountered anthroposophy as scientists and understood Steiner not as a stimulus for beliefs, but as a source of compelling hypotheses that needed to be tested.

Schad was born in Germany on July 27, 1935, in Biberach an der Riss, where he spent the first years of his life in a musical household and breathed in the Upper Swabian nature. After the family moved in the middle of the Second World War, he entered elementary school in Hildesheim. As soon as the

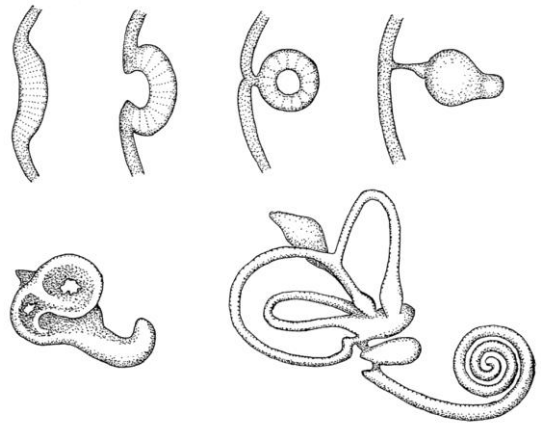
war ended and the only Waldorf School in the entire area of the Rhine and Ruhr opened in Wuppertal on June 17, 1946, he immediately transferred to the 5th grade of the Rudolf Steiner School in Wuppertal as one of the 72 students with whom this school began. There he met the pioneering triumvirate Wilhelm Rauthe from Barmen, Elsbeth von Esebeck from Teltow in der Mark, and Carl Brestowsky from Transylvania. For his biological interests, however, another person was seminal – the school physician Lothar Vogel (1917-1997), who taught epochs in the upper school at the Wuppertal School and dealt with the tripartite structure of the human organism, from where his book which was published in 1967, «Der dreigliedrige Mensch. Morphologische Grundlagen einer allgemeinen Menschenkunde» [«The Tripartite Human Being. Morphological Foundations of a General Study of Human Beings»] originated. Thus, for Schad, an important topic of his later studies was already revealing itself during his high school years. He graduated in 1955. Even as a teenager, he explored his immediate and wider surroundings and sought to get to know nature in all its details, as he encountered it on his walks, trips, and excursions. Everything belonged to nature: stones, plants, animals, and people. During his long life, Schad acquired an incredibly extensive, profound, and thorough knowledge of nature.

Biological Companions

After studying biology and chemistry in Marburg/Lahn and Munich, his path still wasn't clear. However, he had already been occupied with anthroposophy during his studies and had got to know the most diverse people who accompanied him on this path. One of the most influential companions was Herbert Grohmann (1897-1957), the original Waldorf movement biologist, so to speak, who wrote the first books on plant and animal science of the Waldorf School, which were published in the fifties. The ornithologist Friedrich Kipp (1908-1997) became another important interlocutor for him, with whom he shared his phenomenological interests, detailed knowledge, and, above all, questions about understanding evolution. An encounter in a study group on the Rüspe, at that time an anthroposophical study center in the Sauerland, in which people such as Thomas Göbel (1928-2006), Christof Lindenau (*1928), the speech formation teacher and later colleague at the Pforzheim Waldorf School Ilse Schuckmann, the colleague of Wanne-Eickel and founder of the Waldorf School in Kakenstorf Liesel Gienapp (1928-2011), Klaus J. Fintelmann (1924-2005), and others participated, consolidated the idea (with all the knowledge and pedagogical studies at the Pedagogical University in Göttingen that had meanwhile been completed) to go to the

Waldorf School after all. In 1962, Wolfgang Schad began teaching at the Pforzheim Waldorf School. Shortly before, he had married the eurythmist Christiane Schad, who was by his side all his life, supporting his work, and who made it all possible. Without her selfless support, everything else would have been unthinkable.

In the same year, 1962, Stefan and Sigrid Leber began teaching at the Pforzheim Waldorf School. I was enrolled at this school as a first grader in the same year, but I already knew Schad at that time because he had been nursed at our home for some time when an illness had confined him to bed for several weeks. In 1965, the position of biology teacher at the Pforzheim Waldorf School became vacant. Until then, my father Thomas Göbel had been the biology teacher at the upper school of the Pforzheim Waldorf School – Schad was of course given this task with pleasure.



The embryonic formation of the inner ear in humans. 1. thickening of the epidermis in the future ear region (ear placode), 2. invagination of the same, 3. constriction of the ear vesicle, 4. and 5. differentiation of its shape, 6. formed inner ear. a) rest of the former external connection = *Ductus endolymphaticus, b)Utriculus, c) Sacculus, d) Cochlea.* (Drawing: W. Schad after Starck 1955).

On Weekends: Collecting Minerals

From then on, Schad taught biology and chemistry in the upper grades at the Pforzheim Waldorf School. He also taught the anthropology epoch for grade 12, as well as English and Latin in the middle school. In general, most colleagues at that time taught whatever was needed, and his sphere of activity was always varied. While he was teaching, his interest in nature increased. On many weekends, the Göbel, Schad, and Leber families would drive to a quarry to collect minerals, to the Palatinate to find agates, to a field to look for quartz, to a meadow where unique orchids bloomed, or even just to some orchards to turn over every stone along the way and collect the beetles sitting underneath. These were all inspiration for Goethean studies and often evidence that evolution cannot be thought of as simply as some poets writing about nature suggest. Over time, a diverse herbarium and an extensive collection of minerals, fossils, beetles, butterflies, animal skulls, and much more were created. The densely filled boxes piled up both at school and in his apartment. During this time, he intensified his collaboration with his Goethean colleagues, especially Andreas Suchantke (1933-2014) and Göbel, with whom he had one or two skirmishes, which often resulted in mutual – albeit surmountable – minor injuries.

Schad succeeded in stimulating an understanding of nature in his students, which led from the detail to the whole and from the whole to the detail and revealed how every single species, every single event, and every process in nature was related to everything else and organized in a larger whole. And this completely independent of whether a mushroom was studied in the Black Forest, the dwarf birch (Betula nana) in the Harz was distinguished from the downy birch (Betula pubescens) in the highlands or whether it was about the endangered Apollo butterfly (Parnassius apollo), that he had sighted on one of his excursions. Schad fleshed out the understanding of mutual interdependence and organizational structure, which could of course also be called the structure of the ideas, after his first trip to Africa. He embarked on this journey with Suchantke and Jochen Bockemühl (1928-2020). It led him to Kenya and enabled him for the first time to see the diversity of the mammals of Africa so impressively and originally that from then on, a small cue was enough to provoke hours of narration. From then on and throughout his life, Africa never let go of him and was the source of inspiration for his questions for decades. Everyone who knew him knew that he was not much of an organizer or practical tour guide. Nevertheless, the experiences of this journey are reflected in the book «Säugetiere und Mensch» [«Humans and Mammals»], which appeared for the first time in 1971 and in which Schad described in detail how the principle (the idea), which the kingdom of mammals follows with some exceptions, is, so to speak, an unfolded man. Later, he had doubts and supplemented this view with his evolutionary biological investigations. This book – Schad's opus magnum – was published in 2012 in a revised and substantially expanded edition as a two-volume work with the subtitle ‹Säugetiere und Mensch – Ihre Gestaltbiologie in Raum und Zeit› [‹Humans and Mammals – Toward a Biology of Form›].

At that time, in the 1970s, he was not only working on the understanding of the tripartite structure of mammals but was already devoting himself to another life topic: the development of the embryonic envelopes through the different animal classes. I still vividly remember how he described the development of embryonic shells and how, in the sequence of stages of embryonic shells, through the animal kingdom to humanity, the meaning of the stages of development became manifest. Suddenly, an understanding of what constitutes humanity and what puts humans at risk shone in his youthful soul. Schad didn't simplify his depictions for students, he worked out the essential developmental steps from the animal kingdom to humans in all necessary differentiation. In doing so, Schad planted a sense for scientific work in his students. When I handed in my annual work on the tripartite structure of reptiles to him, after all, a book of over 100 pages, he read it and gave it back to me with the words that, unfortunately, he could not judge the results, because he had not familiarized himself with the world of reptiles. That was one of the most impressive reactions for me and typical of Schad. He only judged what he knew. However, he knew a lot and much more than most people and, therefore, seemed to many, discerning in many areas.

In Answering, He Remained Questioning

At that time, the attractiveness of the upper classes of the Pforzheim Waldorf School depended above all on two people, Schad and Leber. They had very different personalities, both in terms of their approach and their appearance – one somewhat ascetic and matter of fact, the other rather opulent

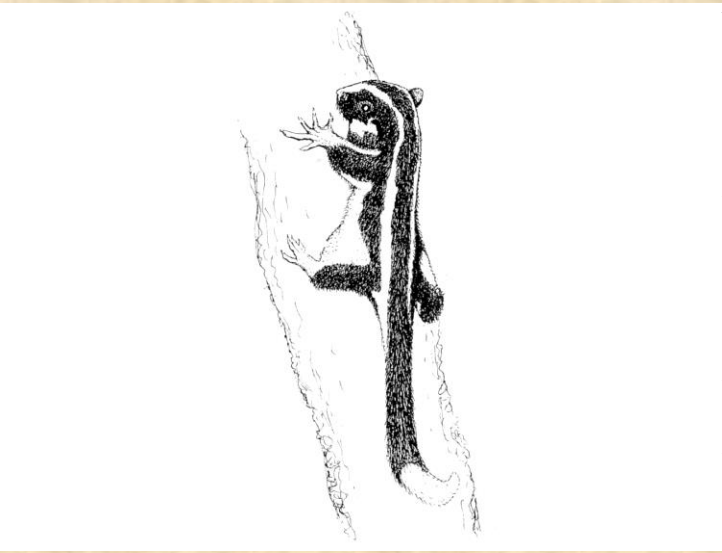
and expressive. Both were committed to a contemporary high school, open to student needs with an affinity for performance and quality, and they worked hand in hand. They valued each other in pedagogical and scientific concerns, and together they were able to achieve a great deal. They led the Pforzheim Waldorf School, supported, by Frieda Gögler and Waltraud Buggert, from very stormy to somewhat calmer, but always forward-looking and future-oriented waters. Both answered our questions about Waldorf education and anthroposophy – but only outside the school. While we were studying tripartite social structure with Leber, Schad introduced us to Waldorf anthropology and cautiously and suggestively to the concept of destiny. He perceived the latent questions and invited us to his apartment to work seriously on the burgeoning questions – he always questioned himself. It was important to him that the Waldorf School was not a place to study anthroposophy with students, and therefore, when working on appropriate questions, he took care to work on those questions away from the school and invited students to his home.

In 1975, Schad was appointed to the Waldorf teacher training seminar in Stuttgart. His Pforzheim colleague Stefan Leber had already moved to the Waldorf teacher training seminar in Stuttgart two years earlier, as had Winfried Schmidt, the sculptor and sculpture teacher. In Stuttgart, Schad didn't find a comparable reception or open ambiance as he had in Pforzheim. For many students at the teacher training college in Stuttgart, Schad became a pioneering lecturer and, as a thorough connoisseur of the anthropological foundations of Waldorf education, also an inspiring role model. But within the college, there were increasing tensions, especially with Ernst Michael Kranich and his quite different view of nature, which was highly suspicious of the Goetheanists – and by that, I mean, of course, not only Schad, but also his Goetheanist colleagues – and he was criticized accordingly. Similar tensions existed in the relationship to the Natural Sciences Section at the Goetheanum, which was sometimes denied its scientism. Anyone who did not know nature in its details and nevertheless dared to proclaim judgments about it was either called a poet and romantic if it wasn't so bad, or disqualified as an ignorant dreamer if the judgments were too far removed from reality. Outwardly, such processes could even proceed amiably, for a distinction was naturally made between the demands of scientific work and the more private encounters with colleagues. In any case, certain reservations did not prevent the natural scientists working at the time from publishing articles in the journal «Elemente der Naturwissenschaft» [«Elements of Natural Science»] – published by the section. In general, Schad was very productive during his time in Stuttgart. He published essays in various anthropological journals, and edited several influential anthologies, including the four volumes on «Goetheanist Natural Science» and the important volume on «Was ist Zeit? Die Welt zwischen Wesen und Erscheinung» [«What Is Time? The World Between Essence and Appearance»].

Astonishing Productivity

During the Stuttgart years, Schad promoted the work of the Pedagogical Research Center, which had been established as a research branch of the Federation of Waldorf Schools. From 1975, he worked on the board of the Pedagogical Research Center, and from 1980-1991, Schad headed this research center and set thematic priorities. He found it challenging otherwise to take on administrative association tasks which took up a lot of time but gave little in return – these tasks were then taken over by Leber. During these years, however, both were to be heard giving lectures at major events of the Federation of Waldorf Schools and were regularly used as lecturers. Always perfectly prepared, Schad was convincing with his crystal-clear line of thought, his usually far-reaching historical references, and many a time he shone with lines from Goethe, with which he pointed to deeper questions of the time. In 1991, for example, just a year and a half after the fall of communism in 1989, he spoke about the tasks of the future and emphatically stressed that the future would not depend on systemic issues, such as whether Marxist or capitalist models would prevail, but that the future would depend on tackling environmental problems.

The big question ahead, he said, is the healing of the earth.



The striped boar Dactylopsila trivirgata of northern Australia. Drawing: W. Schad after Strahan 1984. From: Wolfgang Schad, 'Säugetiere und Mensch'.

He was very sceptical about the environmental teaching that was customary at the time, because it didn't change the behavior of young people. And he outlined environmental education that, while starting with the individual and his changing behavior, aimed to shape the environment on a large societal scale, including new urban planning – a visionary view that the Waldorf movement didn't grasp strongly enough at the time. Schad gave lectures, and wrote essays and books, of course, in addition to all his teaching duties at the Waldorf teacher training seminar. Looking back on that time, we can only wonder how this astonishing productivity was possible.

Even though Schad's effectiveness in the Waldorf teacher training college in Stuttgart was significant for many generations of students, it was socially tricky for him, and he had to consider over time whether he really wanted to or could work in this position in the long term.

The Call from Witten

In this situation, the question to join came from former politician and neurologist Konrad Schily (*1937), who had co-founded the University of Witten-Herdecke (UWH). Schily's intention was to attract more scientists – and subjects – within the UWH that hadn't only worked in the mainstream. For Schad, he was ready to open his own Institute of Evolutionary Biology and to look for basic funding, which he then found from Karl Ludwig Schweisfurth. After much consideration, Schad decided to move to Witten, which also meant a big break for his wife, Christiane. She dissolved the extensive household in Stuttgart and organized the new beginning in Witten. Without her subtle, energetic organization, this change would certainly not have been so easy to master. To do this, however, Schad first had to complete his doctorate and then write a professional dissertation so that he could be taken seriously within an academic environment. He made this effort when he was already in his 50s. In October 1992, Schad became head of the Institute of Evolutionary Biology and Morphology at UWH, however he didn't complete his PhD on the «Heterochronie-Modus in der Evolution der Wirbeltiere und der Hominiden» [«Heterochrony Mode in Vertebrate and Hominid Evolution»] until the following month. For his dissertation, he chose another topic that had accompanied him throughout his life: Die Zeitintegration als Evolutionsmodus [Time Integration as an Evolutionary Mode]. In 1997, Schad qualified as a professor, which allowed him to further expand the Institute of Evolutionary Biology and Morphology. The question of time, what time is, and how it manifests itself in the development of nature accompanied him for a long time, just as he worked on most topics throughout his life.

During the years of his directorship, he recruited a few students (none of the great anthroposophical Goetheanists, by the way, had many students), had to devote himself to the bureaucratic demands of such a chair, and intensified his scientific work. In his research, it became increasingly clear that evolutionary developments don't occur by chance alone, but also not only by teleology. Schad increasingly devoted himself to the inner autonomy of a wide variety of living beings and pursued how this can lead to new forms of development as a result of epigenetic changes, insofar as these are inherited. «The element of chance frees the course of evolution from the ‹teleological determinism› of any plan. In the meantime, quantum and chaos theory have also released it from ‹causal determinism› in its claim to absoluteness.»

Goethe and Life

After Schad had placed the institute's management in other hands in 2005, he continued his occupation with the fundamental questions that accompanied him throughout his life. So, questions about life, time, the inner autonomy of living beings, their interdependence, the freedom of humans, and their

prerequisites in the corporeality of humans, evolution, and their exceptions. In the introduction for a contribution in 2011, he wrote:

In biology there is always already a treatment of the simultaneity of all three modes of time, but without the conceptual conclusion having already been drawn. It deals continuously with the fact that in every living being, its evolutionary past is present as its hereditary material. Likewise, in every living being its potency to many possibilities of realization in the future is present at every moment: The ‹prospective› potency of restitution and regeneration. To combine both makes a permanent present. As a result, in every organism ontogenetically as well as phytogenetically different time streams run simultaneously next to and with each other – we now call this heterochrony. Life consists even more than in the physics and chemistry of the dead in time integration across all three time modes.[1]

Although this quotation is only an outline, it illuminates with how few words Schad could describe basic facts towards the end of his life. In other words, how time and life are interrelated.

In addition, he devoted himself to another lifelong subject which he had always turned affectionately to – Goethe. Many of his essays on Goethe, his conception of nature, and his relationship to Christianity bear witness to this. How Goethe's suggestions find a continuation in Goetheanism kept him intensively busy. Schad tirelessly sought to describe the methodological foundations of Goetheanism and to reflect on this methodological approach. In doing so, he was also concerned with working out the difference between Goetheanism and anthroposophy and presenting different methodological approaches. The older he became, the more themes concerning the spiritual essence of humans emerged. Distancing himself from Goetheanism, which studies the sensually visible world, Schad asked himself how anthroposophy could be developed as a scientific method. And this was meant in a thoroughly practical way. What matters, for example, in the teacher: that the teacher recognizes the necessity of self-reflection, that the teacher discovers themself as the one who is in search of themself and gives destiny the chance to reveal itself. Schad always linked his thoughts and contemplations to the tasks to be accomplished by an individual. He was a practical person in this respect.

'Nature doesn't understand fun at all, it is always true, always serious, always strict; it is always right, and the errors and mistakes are always humanity's.'

Conversations with Eckermann. 2nd part, 02/13/1829

Schad said goodbye to his life and research on October 15, 2022.

Obituary by Nana Göbel 24/2/2023 *is taken in full from https://dasgoetheanum.com/en/wolfgang-schad-a-german-scientist/*

Membership

Note from the Treasurer and Membership Secretary.

The subscription for membership of the Science Group (including receipt of Newsletter) stands at £10 per year. If you have not already done so, please update your standing orders and let me know when this is done. I can still accept cheques but the local bank has closed so paying cheques in is more difficult. Standing orders or direct payment are preferable.
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Next Issue & Thank You

This newsletter is usually issued to members twice each year, in the spring and autumn. This is this Spring newsletter for 2023. However, I must apologise for there not being a newsletter last year, there was a bereavement in my family. I have taken over the role as editor from Judyth Sassoon, and thank her here for her hard work and dedication in putting this newsletter together. ***Thank you.***

Now, this newsletter wouldn't happen without you! So dear readers if you have made it this far, and hopefully you have, then please send copy to the editor by 1/9/23 and let's hope for a bumper autumn edition!
Email: sarahhoughton@stmichaelsteiner.com

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Acknowledgments

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