



The air we breathe

The Golden Blade 1987

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Douglas Jernin
1987

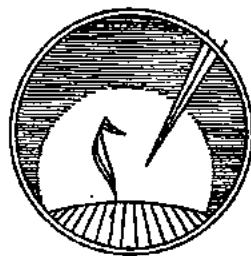
Published by
Hawthorn Press

The Golden Blade

THIRTY-NINTH (1987) ISSUE

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Anthroposophy springs from the work and teaching of Rudolf Steiner (1861 to 1925). He described Anthroposophy as 'a path of knowledge, to guide the spiritual in the human being to the spiritual in the universe'. The aim of this annual is to bring an anthroposophical outlook to bear on questions and activities of evident relevance to the present, in a way intended to have lasting value. It was founded in 1949 by Charles Davy and Arnold Freeman, who were its first editors. The present editors wish to acknowledge their indebtedness in the preparation of this issue to generous assistance by Doris Meeks and Robin Cook.

The title derives from an old Persian legend, according to which King Djemjdid received from his God, Ahura Mazdao, a golden blade with which to fulfil his mission on Earth. It carried the heavenly forces of light into the darkness of earthly substance, thus allowing its transformation. The legend seems to point to the possibility that man, through wise and compassionate work with the Earth, can one day regain on a new level what was lost when the Age of Gold was supplanted by those of Silver, Bronze and Iron. Technology could serve this aim; instead of endangering our planet's life, it could help to make the Earth a new Sun.

EDITORIAL NOTES

Great Decisions are Needed

Luke Howard, the man who gave the different kinds of cloud their names, had a very humble idea of himself and great confidence in the future of humanity. Patiently he observed London weather, and found it convenient to call layers of cloud *stratus*, heaped-up clouds with a horizontal base *cumulus*, high strands of cloud like delicate filaments *cirrus*, and rain clouds *nimbus*. What he wrote about these forms deeply impressed Goethe, and Howard's names are widely used today. Howard felt deeply the goodness of Nature and the goodness of human beings — and in particular the promise of scientists and genuine Christians for the future. (Even writing to Goethe, he had some reservations about the capacity of poets, 'even our own Milton' to deal with the sublimest things). Much was dark in his time; but he believed the darkness would be overcome.

Today it is difficult to believe in a good future, although most people we actually meet strike us as good. When Satish Gumar, later editor of 'Resurgence', walked round the world preaching peace, he found most people good, kind and hospitable to the point of sacrificing things they needed themselves. Who can think of anyone thoroughly evil he has known intimately? And yet for many people the only problem about the future is by what particular means we shall destroy the earth; since Chernobyl, there is a widespread sense of helplessness and hopelessness.

And yet human beings can decide what they do. Because a particular technology exists, it does not have to be used. For the last 200 years we have been restricting technology, and the untrammelled effects of market forces, in a multitude of ways by laws, regulations, and international agreements. *Humanity has the power to choose*; to recover our belief in this, is the first necessary step. It is hard to choose, unless we are rightly informed. There is widespread distrust of what 'experts' say; and there is good reason for this. Experts very often depend for their livelihood on governments or multinational corporations; and it is not easy for them to avoid being influenced by this fact, though they may try hard to be unbiased. Students, and the general public, grow increasingly sensitive about all this. Perhaps in no spheres of modern life is it more difficult to find unbiased statements of fact than about nuclear energy and about pollution. Everywhere people gather bits of information and repeat them as weapons in debate without seeking to learn more. But there are two reasons for hope. Everywhere there is also a longing for the freedom of the spiritual life, as Rudolf Steiner described it; freedom of education, of the development of the arts, of the judiciary, of speech and assembly, are examples. And very often human hearts are better

guides than human heads. For below the head and nerve system we are much more in touch with the elemental beings, and the whole great 'cloud of witnesses' of which Paul spoke, than within it. It is easy to condemn those who are guided by their feelings as sentimental; though they often turn out to be right. But feelings need to waken from a dreaming condition, if they are to be fully effective. They awaken through individuals learning to perceive and respect the opinions and rights of others, and developing their own capacity to act with others in a way that can have a real influence in the world.

The very last Letter written by Rudolf Steiner before his death, to Members of the General Anthroposophical Society founded not long before, contain his final guidance – and challenge – about the control of modern technology. Humanity is surrounded today, and in the life of will deeply involved, with much that no longer belongs to Nature, but to Sub-Nature. This has a powerful influence upon man. The products of modern technology are governed by purely Ahrimanic forces, which we shall only learn to control if we come to rise spiritually as much above external nature as our technology falls below it. We have not yet learned the right and necessary relationship with Ahriman.

From Rudolf Steiner's whole life, writings, and lectures concerned with this subject, it is evident that the right relationship to Ahriman is not to be found by hating or fearing him – hate and fear are indeed among his own manifestations within the soul – or avoiding all his works, but first by understanding him and his realm. We need to recognise that such beings exist, and what their purposes are. They do not share at all the purposes of those spirits through whose work humanity came originally into being. They hate freedom, desiring to make of humanity a complex machine among machines, unable to raise his soul into true spiritual worlds, even after death. Ahriman has as yet no will at all to accept the Christ, but mocks him. The good powers do not mock Ahriman; they try to show him where the limits of his influence should be – and in this they need the help of humanity.

Through this knowledge the modern world – so full of good people, and yet with so much violence – becomes infinitely more comprehensible. Every bit of human technology, all the way back to the axe and the plough, needs to be controlled by insight, reverence for the earth, and conscience. Reverence for the earth includes non-violence towards the animals, so appallingly sinned against in present day medical research; conscience includes respect for the rights and feelings of each single individual or group.

In all uses of electricity we are already well within the realm of Ahriman; but in the use of nuclear energy, and the threat to use nuclear weapons in war, we are taking a tremendous further step towards co-operating with his intentions. Those who say that we cannot do without nuclear energy are misleading us. For humanity to abandon the use of nuclear power and

nuclear weapons would be extremely difficult politically and economically, but technically quite possible without anyone suffering great hardship. A number of relevant facts are given in Daniel T. Jones's article in this issue. There are wide differences in the extent to which developed nations depend on nuclear power. France, without fossil fuels of her own, was in 1985 obtaining 67% of her electricity from nuclear plants; Japan, the only other major capitalist country going ahead with nuclear power, only 27%. Corresponding figures for the USA are 16%, the USSR, 11%, and Britain 19%. It is evident that the intention to be independent, economically and militarily, has been a strong motivation for the support given by national governments to nuclear research and to civil nuclear development. It would not be at all easy for French industry to adapt itself to the use of alternative sources of energy, complemented by imports – though this would not be difficult from a world-economic point of view. Japanese industry could probably adapt itself more quickly than any other; it is already a pioneer in solar power research.

Technically it would be possible to improve the use of fossil fuels, to make them much less dangerous to plants, animals, and humanity – and before long to eliminate them *as sources of energy*, though the obstacles are great: accustomed patterns of thought, and entrenched interests and practices in production and distribution. There are alternative, sustainable sources of energy much more favourable to the environment: solar energy, wind energy, river and tidal power, geo-thermal energy. Some years ago the Dutch people, not taken very seriously by others at the time, voted for windmills as their preferred source of energy. Denmark has now a lively trade in highly efficient portable windmills. Both windmills and solar energy are very suitable for small-scale use; solar energy would be eminently suitable for Africa, as Daniel Jones points out, but need not be excluded from consideration in cooler climates.

From the welter of discussions the defensible alternatives, from the point of view of humanity as a whole, seem to be between the abolition of nuclear processes as sources of energy altogether, or their radical slowing down, until much more is really known about the health hazards and dangers involved. A state of affairs in which many thousands of people can be rendered homeless in a matter of hours, not to speak of the other consequences of a serious accident, is surely not acceptable. And the best available evidence seems to indicate that a similar or worse accident could happen in any nuclear plant, at any time, as things stand.

A leading Western politician said recently that the world would face economic disaster if it tried to do without nuclear power, and must learn to live with its fear of accidents. But his arguments were based on assumptions which can be questioned.

1. That the world consumption of energy will increase at the rate of 2% a year or more for the foreseeable future. The affluent countries could

decide *not* to increase their consumption of energy, but decrease it very considerably, by better insulation, economy, and in other ways, as Sweden has decided to do. Even without such a decision, the industries of the future will be less demanding of energy than those of the past.

2. That we can calculate the real cost of nuclear energy. No-one knows the real cost of dismantling a nuclear power station when it becomes unusable after about 25 years; no-one can assess the cost up to now, or in the future, of the Chernobyl accident, inside and outside the USSR. The estimates of the levels of exposure to radioactivity acceptable without danger to health vary widely, by as much as one hundred times. No-one knows for certain.

3. That much of the Third World will be able and willing to accept and use nuclear energy on a large scale to help its economy. The greatest real needs of Africa, however, are peace and trees. Let a very experienced and practically minded Zulu speak:

'Piece by piece I want to convince human beings that all trees are guardians of the earth . . . In my heart I am convinced that this intention will transform the deserts of the Sahara, of the Kalahari, of Namibia and others into green pastures. I am content in the certainty that I am doing what God asks of me, and that the whole world would stretch out its hands to me, in order to create a green carpet in Africa and the world.

This was Robert Mazibuko, at 85 a warm adherent of biodynamic agriculture, after planting 10,000 fruit trees in his region, and taking far-reaching steps to multiply the rate of planting. Electricity from solar energy could be very useful to support small scale irrigation for tree planting and other forms of cultivation (and for cooking, with Africa's desperate fuel-wood crisis).

'I am content in the certainty that I am doing what God asks of me'. Similar words can be spoken in a mood of fanaticism or violence; the test of their genuineness is whether they are accompanied by a tranquillity that lives within the soul and *makes* peace among human beings. When such words are true, a human being carries into earthly life something experienced in the heights of the spiritual world before birth. And gradually we shall come to recognise with many people we meet that they bring into a civilisation, where so much of Sub-Nature surrounds them, and in which they feel instinctively the powerful impulses of Ahriman or Mammon, their own very individual vocation from before birth, perhaps in order to contribute to an alternative culture, or perhaps to bring into external technology moral forces strong enough to alter and control them – or both. Two personalities who died recently are outstanding examples: Michael Wilson and Helmut Siber. Michael Wilson was at home, and influential, both in the anthroposophical movement and among those engaged in scientific research about colour, with its many technical uses. Helmut Siber brought an utterly individual,

profoundly reverent quality into his paintings of clouds, and shared directly in the harshest forms of industrial work with the hope of influencing their development elsewhere in the world.

There is often tension, sometimes reaching tragic intensity, between the sense of belonging to the cosmos, bringing from its heights a vocation for the earth, and the influences of heredity and environment. This tension may reach a peak between the ages of about 17 and 35. Rudolf Steiner has said that it is a particular concern of the Christ in our age to bring healing for this tension. He comes 'in the clouds' – that border land where the unborn and the dead meet with the spirits of the Hierarchies, the elemental beings, and the tempters of humanity. Of this border land the visible clouds in the earth's atmosphere are truly part. They are not only what the meteorologist can express in quantities, any more than a human being is only what can be measured, weighed and put into statistics.

The Christ Spirit is concerned with utter selflessness for every living thing. Ahriman wants to turn everything into a machine, and hates freedom. The Christ does not seek to destroy Ahriman, but to limit him, and ultimately to redeem him, with the help of humanity. Ahriman fascinates himself, and fascinates us, with his own technology. When we choose non-violence, – appropriate, small-scale technologies, realising to the full the dangers to the earth brought even by them – we begin the work of redeeming him.

As human beings become more aware that they have a vocation from the spiritual world – or perhaps feel it subconsciously – they grow less possessive of property and other people, and less nationalistic in the narrow sense, less 'tribal' or racist. For them three things grow more significant – nature as a whole, humanity as a whole, and the free individual. To at least one of these all the conservationist, alternative cultures and peace movements are deeply attached; they have common spiritual roots.

In general, money dealings are an opportunity to limit Ahriman's power, by bringing into them more consciousness and more humanity. We have a long way to go. Money can be used for purchase, as loan, or as gift. All three uses can be accompanied with more or less insight. To spend money on something humanly worthless diverts labour from better purposes; this is one reason why it is harmful to a community if the range of incomes and property is too wide between affluence and poverty. It can be very healthy in a community when money is wisely *lent*; but the loans to Third World countries, largely used to purchase armaments, are among the most disastrous ever made, for all concerned. But it is a most hopeful sign that all over the world the opportunity to *give* to Africa has been seized so effectively; though much foresight and care is needed for the right use of gifts.

Money should not be opaque and deceptive, but transparent, making visible the reality; human labour, food, insight. Sun must shine through the darkness, possessions be held on trust for mankind in general, body be

transformed by spirit. It is vital that it should be believed that human nature is capable of all this, indeed was created for this purpose. Matter itself awaits redemption through us.

Two small, courageous booklets, very relevant to this task, have recently come to us from America, 'Sacramental and Spiritual Communion' by Dietrich V. Asten, and 'About your Relation to Rudolf Steiner' by Professor Ernst Katz. Both books are quite short, but contain the essential wisdom gathered in a lifetime. Dietrich Asten gave his lecture on the morning of July 7th 1984 and died, suddenly and unexpectedly, shortly afterwards. Professor Katz' book was published in 1985, when he had studied anthroposophy for more than 50 years. He retired as Professor of Solid State Physics at the University of Michigan in 1980. He continues as active president of the Rudolf Steiner Institute of the Great Lakes in Ann Arbor.

D. V. Asten spoke of communion with Christ, participation in the love and purpose for earthly humanity which streams from the Mystery of Golgotha. How this participation can come about through the sacrament, as it lives in the Act of Consecration, celebrated in the Christian Community; and in the spiritual Communion as Rudolf Steiner described it, an event fulfilled within the soul of man. He tells very beautifully parables which show the difference between these two forms of communion, and describes four stages by which each is accomplished. There is no question of preferring one to the other; and any individual can choose for himself in what way he seeks either or both. The future of humanity depends on both.

Professor Ernst Katz writes of the connection, which should be preserved and deepened, between the teachings of Rudolf Steiner and his individuality, whether in incarnation or in the spiritual world; of the greatness of the Sun-Initiate and of the possibility for the student of finding towards him the relationship of friendship, when the full meaning of the word 'friend' is realised. He describes the warmth shown to human beings by Rudolf Steiner on earth, and the 'selfless selfhood' which was the essential element in his words and deeds.

These two small books can help to bring hope. Only a slight indication of the richness of their content can be given here. They indicate ways to approach the mysteries of the spiritual Sun; how the soul can lift itself towards the Sun-Sphere, where the great Initiates serve the Christ – and how, in so doing, the soul purifies not only itself but the substances of earth of which our bodies are formed; and how at the altar the gifts of the earth are consecrated to carry within them Christ's healing power.

The Sub-earthly is not only Ahriman's, though the Gospel does call him 'the prince of this world'. The Sun-spirit has entered the Depths, that he may make the fallen earth a future sun. Groups of people who begin to feel the greatness of these hopes will be strong enough to make the 'massive powers' crumble; if our prayer and our meditation grow intensive enough – weak creatures though we are, as even the elemental beings well know.

CHANGES IN THE EXPERIENCE OF BREATHING

Rudolf Steiner

Dornach, 26th March, 1922

(notes unrevised by the lecturer)

There is much talk in our time about the difference between Faith and Knowledge. Among other things it is often said that Anthroposophy – from the very nature of its contents – ought not to describe itself as a Science but as a Faith: as a conviction, a belief. Fundamentally speaking, all the distinctions people make along these lines are due to the fact that they have little insight. They neither know how 'Faith,' so-called, has arisen in the long course of human evolution, nor have they any deep insight into what 'Knowledge' really is.

All that is 'Faith' – all that belongs to the word 'Faith' – goes back into very ancient times of human evolution; those times I mean, when the breathing process played a far greater part in the life of man than it does to-day. Man, with his present mood of soul, pays very little heed to his breathing. He breathes in and he breathes out, but he has not any notable perception or experience in consciousness as he does so.

The Faiths of ancient time always laid stress on the importance of the breathing. We need but recall the Old Testament, where – as I mentioned in a former lecture – the very creation of man is related to his having the breath breathed into him. We need but recall what I explained about the striving that existed in Ancient India, to achieve higher knowledge by a certain regulation of the breathing process. This striving was intelligible in an age when, even in ordinary life, men were more heedful of their breathing process. As I explained, it was an age when man perceived around him not only the dead Nature that we perceive to-day, but soul and spiritual workings in all the things, in all the facts, of Nature. Yes, he perceived activities of soul and spirit in every spring, in every cloud and river, nay, in the wind itself. During that age the higher aspiration was to make the breath more and more conscious; to regulate the in-breathing, the holding of the breath, and the out-breathing. By such regulation of the breathing process, he engendered what we may call self-consciousness: the inner experience of the 'I', of the 'I am'. That was a time however, when, as I said just now, the perception, the conscious experience of the breathing, played a considerable part even in ordinary human life. Out of his ordinary consciousness the man of to-day can have little concrete idea what it was like. Let me now try to give you an idea.

The breathing process naturally falls into the in-breathing, the holding of

the breath, and the out-breathing. This process is regulated by human nature. The Yoga scholars of whom I told you regulated it differently. Just as a man who studies nowadays evolves a thinking different from that of everyday life, so, in the times when breathing played a special part in life, they evolved a different breathing from the everyday. But we will not now look at the Yoga breathing, the developed breathing, but at ordinary breathing. I can most easily describe it in a diagram. We distinguish the inbreathing process, the holding of the breath, and the outbreathing. When in those olden times a man breathed in, he felt as though with the inbreathing, — *i.e.*, with the in-breathed air — there came into him from the outer world that which was spiritual in the beings and events of the outer world. In the stream of the inbreathing he experienced, for instance, the Gnomes and Nymphs — in a word, all that was soul and spirit in surrounding Nature. And when he breathed out — sending the air of the breath outside again — in the outbreathing these beings became once more invisible to him. They merged, as it were, in surrounding Nature, and were lost to him.

Thus you breathed in and knew: 'There, in the world of Nature outside, is soul and spirit'. You felt united with this soul and spirit of external Nature. This experience had a kind of intoxicating effect (though I use the word only for the sake of comparison) on the human being of those times. He intoxicated, entranced himself with the soul and spirit of the surrounding world. And as he breathed out, he made himself cool and sober again. Thus he lived in an intoxicating and a sobering process, whereby he came into mutual interplay with the soul and spirit of the surrounding world.

But there was something else as well. In breathing-in — intoxicating himself with the soul and spirit as it gently rose from the stream of the living breath into his head — man felt the beings of soul and spirit filling him within, uniting with his own bodily nature. We can express what he felt somewhat as follows: 'I breathe-in the soul and spirit of the surrounding world. It fills my head. I am aware of it, I feel it'. Then he held his breath. And then, as he breathed out, he would say: 'Now I give back again my feeling of the soul and spirit'.

All this, however, was intimately connected with his daily life. Take but this simple example. Here lies a piece of chalk. Nowadays, when you take hold of the chalk, you first look at it, then you seize it and pick it up. You did not do so in that ancient epoch. Nowadays, as we look at the chalk, we have a certain thought; then we pick up the chalk. The man of olden time did not do so. He looked at the chalk, breathed-in that which went out from it spiritually, and then breathed out again. Only then, in the out-breathing process, did he take hold of the chalk. For him, in other words, in-breathing was equivalent to contemplation, out-breathing to action.

That was a time when man was always living in a kind of rhythmic interplay with the surrounding world. Indeed, this rhythmic interplay was

even preserved into far later times; yet without the living and seeing consciousness of those olden times. Think for instance how in our youth they still would thresh the corn by hand in country places:— 'Look, and thresh; look, and thresh'; in rhythmical activity. This rhythm corresponded to a certain breathing process.

Inbreathing — Observing

Outbreathing — Doing

In later times the corresponding inner experience of the in-breathing vanished from human perception; man only perceived — only perceives, even to-day — that of the breath which goes into his head-nature.

In olden times man perceived how the in-breathed air — like an intoxication for him — went on into his head and there became united with his sense-impressions. Afterwards this was no longer so. Man loses from consciousness that which goes on in his chest-organisation. He no longer perceives this upward-pouring of the breath, because in effect his sense-impressions have grown stronger, and they blot out that which rises up in the breath. Even to-day, whenever you see or hear, the breathing process is there in your process of seeing; and in your hearing, too. In the man of olden time the breathing itself lived strongly in his hearing and his seeing; in the man of to-day the seeing and the hearing are living so intensely that the breathing is eclipsed, toned down, overwhelmed. For us, there lives no longer what was perceived by the man of olden time, entrancing him, pouring throughout his head, till he exclaimed: 'Ah, the Nymphs! Ah, the Gnomes! Nymphs: how they are whirling in my head; Gnomes: how they are hammering! Undines, waving and surging through my head!' To-day the hammering, surging and whirling are eclipsed and overwhelmed by that which comes from the actual seeing or hearing, filling our head, as it does to-day.

Thus there was a time when man had a stronger perception of this upward-streaming of the breath into his head. This then went on into the epoch when he perceived all these things intermingled. He still had some perception of the after-echoes of the hammering of the Gnomes, the waving of the Undines, the whirling of the Nymphs; he still perceived the connection of these after-echoes with his perceptions of sound and light and colour.

Then, in a still later time, what he had still perceived of the breathing process was lost altogether; and those who still had a vestige of consciousness, how that the breathing had once conveyed into Man the soul and spirit of the World, gave a Name to that which remained with them — that which became established — of the sense-perception in its connection with the breathing. They called it 'Sophia'. (But the breathing itself, they no longer inwardly perceived.) Thus the spiritual content of the breathing was deadened down — or rather, maimed and paralysed — by sense-perception.

It was felt especially by the ancient Greeks. The Greeks had no idea of such a science as we have to-day. If you had told them of the kind of learning that is taught in our Universities, it would have seemed to them as

though some-one were constantly pricking their brain with tiny needles. It would have been unintelligible to them that man could derive any satisfaction from this 'Science'. If they had been called upon to assimilate such a science as we have to-day, they would have said: It makes the brain sore, it wounds, it stings and pricks the brain. They wanted still to perceive something of that blissful outpouring of the entrancing breath, in which, as it streams inward, all that is heard and seen by man is merged.

Among the ancient Greeks, in effect, there was still a perception of an inner life within the head – an inner life such as I am now describing. This inner life they named *Sophia*. And those who loved to unfold this *Sophia* in themselves – those who especially inclined to devote themselves to *Sophia*, – they were the ones who called themselves *Philosophers*. The word 'Philosophy' undoubtedly points to a living inner experience. The hideously pedantic way of learning Philosophy, where you merely 'cram' it, as the undergraduates say, – this way of making yourself acquainted with Philosophy was quite unknown in ancient Greece. It was the inner experience 'I love *Sophia*' which came to expression in the word 'Philosophy'.

Now just as the breathing process, passing into the body, was received in the head by the sense-perceptions, so that which poured outward as the out-breathed air was received by the rest of the body. As the sense-perceptions – all that was seen and heard – flowed into the entrancing experience of the in-breathed air as it poured itself into the head, so did the bodily feelings – the inner experiences of the body – merge in the metabolic and limb system with the out-breathed air. The out-breathed air with its calming and sobering quality – extinguishing perception – merged with the bodily feelings that were kindled in walking and in working. Action, activity, was connected with the out-breathing. Whenever a man was active, whenever he did some work, he felt as though the soul and spirit were going from him. Whenever he did some work, he felt as though he were pouring the soul and spirit into things. 'I receive the soul and spirit, it entrances my head, it unites with what I see and hear. – When I do something, I breathe out. The soul and spirit goes away. It goes into whatever I am hammering, or taking hold of; it goes into all the work I do. I let the soul and spirit go. I convey it to the outer things – when I whisk the milk for instance, or do any other kind of work externally. I let the soul and spirit flow into the things'. Such was their feeling, such their experience, in olden times.

But this perception of the out-breathing process with its sobering influence came to an end. Only a trace of it was left in ancient Greece; people still felt to some extent, when they were working, how they were giving something spiritual to the things.

Then, however, all that was there in this breathing process became eclipsed by the mere corporeal feeling – the feeling of effort and fatigue in the work. Just as the in-breathing process was maimed towards the head, so

was the out-breathing maimed towards the rest of the body. The spiritual out-breathing process was paralysed by the bodily feeling – the feeling of exertion, the feeling of becoming heated – in a word, by all that was living in the human being so that he felt his own strength as he applied it to his work. He now no longer felt the out-breathing process in himself as fatigue; he felt a force working within him, he felt his body permeated with energy and strength.

This force that lived within the human being was *Pistis* or Faith – the feeling of the Divine, of the Divine force and energy that enables a man to work. *Pistis*: Faith.

Sophia = the spiritual content of the breathing, toned-down by the perceptions of the senses.

Pistis = the spiritual process of the outbreathing, toned-down by the feeling of the body.

Thus Wisdom and Faith flowed together in the human being: Wisdom towards the head, while Faith was living in the whole man. Wisdom, in effect, was the only ideal content; Faith was the inner force of this ideal content. The two belonged together. (Hence the name of the one Gnostic writing that is preserved to us from antiquity: *Pistis-Sophia*.) In *Sophia* they had a thinning-out, a dilution of the old in-breathing; and in Faith a condensation, a thickening, of the out-breathing. Thereafter, Wisdom grew still more thin, and in its further dilution became 'Science'. Meanwhile the inner force grew still more 'thickened', until at length man only felt his body; he lost the consciousness of what Faith or *Pistis* really is. And thus it came about that human beings – no longer able to sense the real connection – severed the two. The mere content of Faith was now supposed to arise as it were subjectively from within; while Science was united with the outer sense-perceptions. First was *Sophia*; then *Scientia* – the ordinary science or learning of our time – a thinned and diluted *Sophia*. Originally, *Sophia* had been a spiritual Being whom man had felt inhabiting his head. To-day, he has but the spectre of that Being, for science is the spectre of wisdom. Oh, it should go like a kind of meditation through the soul of the man of to-day: his science and his learning are but the spectre of Wisdom.

And so it is on the other side with Faith, or what is called so nowadays: only in this case the change has not been cast into words. The 'Faith' that lives to-day is not the inwardly experienced Faith, the *Pistis* of antiquity; it is subjective, deeply bound up with personal egoism. It is the 'thickened' Faith of ancient times. Time was when in this not yet thickened Faith men still experienced the objectively Divine within his being. Nowadays, Faith is only found ascending as it were like smoke, subjectively, out of the body. Thus we might say: As Science is the ghost of erstwhile Wisdom, so is the Faith of to-day the erstwhile Faith, grown thick and heavy, – the *clod* of erstwhile Faith.

These things, my dear friends, must be seen together; then we shall no

longer judge so superficially as many people do to-day, saying that Anthroposophy is a mere Faith, a content of Belief. They do not know what they are saying; for they have never acquainted themselves – from the true History of mankind – with the whole relationship of Faith and Wisdom, the inner experience of One-ness of Faith and Wisdom. Where ever to-day does one hear tell of History such as we here describe? Where do they tell of what the breathing process was for man, once on a time, representing as it did an utterly different inner experience from what is ours to-day? Where ever to-day do they become conscious of the fact: how abstract on the one hand, crudely material on the other, has become what once upon a time was a real entity of soul-and-spirit on the one side, and soul-and-body on the other?

When the evolution of Faith had reached a certain point, then indeed it became necessary for mankind to receive something quite definite into the content of Faith. In ancient times man *had* the Divine within the content of his 'Faith'; for he experienced the Divine in his out-breathing process. But the out-breathing process became lost to him in conscious life. He was no longer conscious how the Divine, in the out-breathing, goes out and is conveyed into the things man works upon. He needed for his consciousness a calling-to-life-once-more of the Divine. And he obtained it in due time, by receiving into himself an idea for which there is no outer reality on Earth. It has no outer reality on Earth, that the Dead rise up out of their grave. But the Mystery of Golgotha – the Mystery of Golgotha has no real content for a man who merely describes the life of Jesus until His death. There is nothing much in that; and to modern Theology – truth to tell – Jesus is no longer very much; for there is nothing much in the way this Theology describes the story of His life, – where a human being goes through such and such experiences and then dies. No, the Mystery only begins with the Resurrection, – with the living life of the Christ-Being after the physical body had passed through Death. This, after all, is also according to the words of St Paul: he who does not receive into his consciousness the idea of the Resurrection, has received nothing at all of Christianity. Hence, too, modern Theology is only a 'Jesuology', it is no real Christianity. Christianity needs an idea referring to a reality that does not take place on Earth as a direct perception of the senses: an idea which, as idea already, raises man into the supersensible. By an inner experience in consciousness, the man of olden time was raised into the Supersensible. I told you how the Yoga pupil was led to the conscious inner experience of his babyhood. He experienced the impressions of his earliest babyhood: i.e., of that which plastically works, forming and moulding the human being in his first childhood. What man in ordinary life knows nothing of, this was made conscious by the Yoga-exercisess of which I told you. And therewithal, the whole of the pre-natal life was made conscious: that is to say, the life before conception when the soul of man was in the spiritual world, before descending to take on a physical corporeality.

Afterwards, no more remained of this experience but an idea. The idea is indeed contained in the Gospels: 'If ye do not become as the little children, ye cannot penetrate into the realms of the Heavens'. This word truly refers to the very same experience, – only in that time it no longer had an immediate reality in life. It was like a recollection of how, long ago, the human being had been able to transplant himself far back into the time of little-childhood and had thus been able to experience the realms of the Heavens whence he had come down through birth into physical experience. It is scarcely to be supposed that man to-day, when he hears from the Gospels or from other ancient forms of speech about 'the Realms of the Heavens', has any clear idea of what it means. He thinks, maybe: Yes, certainly, I have seen it on Earth; there are the realms of France, of England and so forth; it is divided into realms and dominions. Such realms as there are here on Earth, there are up yonder too: the realms of the Heavens. The man of to-day can have no concrete idea of the realms of the Heavens, if he cannot conceive transplanted thither what is familiar to him down here. I think in English they even say: 'the Kingdoms of the Heavens'. But you get no real idea of what lies in this modern expression, 'the Realms, or Kingdoms, of the Heavens'. Nay more, the Gospel generally puts it so that you are even less able to see what it really means; for the Gospel speaks of the Realm (or Kingdom) of God, whereat the man of to-day probably thinks scarcely at all; but is content to let the mere word resound.

Truth is, the 'Heavens' of olden time were no more nor less than that which spread out around as the great sphere of the Universe. And the 'Realm', the 'Kingdom', – what was that? Apart from all Philology, let us here have recourse to that observation which is given by pure anthroposophical method. *The Realm – das Reich* – is that which *reaches (hinreicht)*, yonder and all around us. It is that which *reaches* far and away, sounding forth and speaking. Yes, we must rise to this conception. Throughout the Heavens, for him who learns to hear, the soul and spirit are sounding forth. Man not only sees the Heavens, but he hears the cosmic Word, sounding and reaching with its sound throughout the Heavens.

Whoso cannot become like little children, cannot perceive the Word of the Heavens – the Word that speaks out of the Heavens on all sides. And if we call the earthly realms 'realms', and earthly rulers 'rulers of these realms', we ought in truth to have the hidden notion that these rulers can speak or sing so loud that their voice would sound forth throughout their several realms. Symbolically it used to be expressed in the giving of laws, which were proclaimed with trumpet-call to the four quarters of the Heavens; thereby the 'realm' became reality. The realm was not mere surface on which so many human beings dwelt; the realm was what the trumpeting angels carried forth into the far reaches of space, as the content of Laws which were given.

Yet this was only a memory. Another conception now had to come, –

related rather to the Will. (For the former conception was related to the Idea – to Thought.) This one must relate to that which goes with the human being when he passes through the Gate of Death. The Will remains, as the energy that man unfolds; goes with him through the Gate of Death with the content of cosmic Thoughts. The human Will, filled with the World-Thoughts, goes with him into the spiritual worlds when he dies. And to this Will the new conception appealed: namely, the concept of the risen Christ – of Him who lives on even when for the Earth He is dead. This was the strong and mighty, force-filled conception – not merely a recalling of childhood but a pointing-forward to Death, appealing to that in man which passes with him through the Gate of Death.

Thus we find, truly founded in the very evolution of History, the bursting-in of the Christ conception, and of the whole Christ Impulse.

It must of course be admitted: even to-day there are many on Earth who know nothing of the Christ. Those who do know of Him, – their knowledge is generally poor. Nevertheless, they learn something of the Christ – even though in the sense of modern materialism the conception of Christ, the feeling of Christ which they bear within them, is not the right one. But there are also many human beings upon Earth who live in other and more ancient forms of Religion. Here the great question arises, which I indicated once before.

The Mystery of Golgotha, I said, is a fact. Christ died for all men. The Christ Impulse has become a force of all the Earth. In this objective sense – apart from consciousness – Christ is there for Jews and Heathens, Christians, Hindus, Buddhists and all the rest. He is there. He lives since the Mystery of Golgotha in the forces of evolution of all Earth-mankind. Yet it still makes a difference, whether the human being lives within a Christian or a non-Christian region. Albeit, we can only study *what* the difference is, when we perceive the connection between man's earthly life and the life which he unfolds between death and a new birth. If a man passes through the Gate of Death, who in his earthly life – let us say – was a Buddhist or a Hindu; if, therefore, in life he received no idea or feeling about Christ at all, – then he takes with him for the Cosmos after Death that which the human being can learn and discover upon Earth about Nature, his outer world-environment. In Heaven there would be no knowledge of Nature, did not man carry thither the knowledge of Earth when he enters through Death into the realms of the Heavens. Man carries what he receives and absorbs here upon Earth, with him into the realms of the Supersensible, when he passes through the Gate of Death. Thereby alone the supersensible worlds have any knowledge of the mineral, the plant, the animal nature upon Earth. But it is different with him who knows something of Christ, and notably with him who is able to conceive that Christ is living in him, according to the words of St Paul: 'Not I, but Christ in me'. He carries into the supersensible world not merely the knowledge of Earth but the

knowledge of earthly Man. Thus both are carried thither, even by the man of to-day. The Christians carry into the supersensible world the knowledge of earthly man – of the bodily, earthly formation of man. The Hindus, Buddhists, etc., carry into the Heavens the knowledge of that which surrounds man. Human beings, even to-day, do indeed complement one another as to the contributions they give to the supersensible worlds when they pass through the Gate of Death.

It is of course growing more and more necessary for all the secrets which man can experience – in and through himself *as man* – to be carried into the Heavens. Mankind must become increasingly 'Christened', through and through. This, above all, is important: – that that which man experiences only here on Earth, *as man with other men*, be carried through the Gate of Death by means of Christianity.

Think only what an important truth this is, – a most essential truth. Take for example the Hindu or the Buddhist. What he experiences in contemplating the world, in sensing and feeling the world, – all the thoughts he experiences about the minerals, all the sensations about the plants, and feelings about animals, – all this he carries through the Gate of Death, and he enriches the knowledge of the Gods in the supersensible world with all that he thus experiences.

What, then, of the Christian? He, for his part, takes through the Gate of Death what he experiences in that he comes into social relationship with his fellow-men, develop social relationships and systems – a thing one can only experience as man among men, in human brotherhood on Earth. The Buddhist, I would say, carries the Beauty of the world through the Gate of Death; the Christian carries the Goodness of the world through the Gate of Death. Truly, they complement one another. Nevertheless, the progress of Christianity consists precisely in this: that the social relationships of men on Earth grow in significance for the celestial worlds.

Old Oriental tyrants might behead ever so many people; in a certain sense it touched the yonder world but little. It touched them only inasmuch as man received outer impressions thereby. The outer impressions of abhorrence and the like were carried through the Gate of Death. But the unlovingness, the hatred between men, engendered by the wretched social conditions nowadays, or the false Socialism that is spreading over the Earth to-day by misunderstanding the true social relationships, is fraught with significance for the supersensible worlds into which man enters through the Gate of Death. And if in the East of Europe to-day, under the flag of realising Socialism, an appalling and destructive power is unfolded, – what is experienced there too is carried into yonder worlds as a terrible result. And if in the age of materialism loveless relations are developed between man and man, this too is carried through the Gate of Death into the supersensible worlds, to the abhorrence of the Divine-spiritual Worlds.

This is the very thing which man should attain through Christianity: the

power to carry even into the supersensible worlds the results that come about in earthly evolution through his agency. What man himself develops here on Earth:— through the thought of the risen Christ, as of a living Being who has passed through Death and is yet alive, he becomes able to carry it into the spiritual worlds.

Hence, too, those human beings who would not like their social actions to be carried through death, have such a horror of recognising the Risen Christ.

The world of the physical senses is really connected with the supersensible, and we do not understand the one unless we understand it in connection with the other. Once more we must come to understand what goes on upon the Earth by understanding the spiritual events of the great Universe. We must learn not to speak abstractly of Spirit and Matter, but, to observe the human being: how once upon a time in the breathing process he felt a connection with the Divine soul and spirit of the world. Thus we ourselves shall come to experience again the soul and spirit of the Universe in the way we *can* experience it in our time. There is no other way of bringing about a healing of social conditions on the Earth. People will cry aloud for social reform, but they will attain nothing at all. On the contrary, all things will more and more go down into decay, unless this 'Christening' takes place among men. But it must be a 'Christening' bent on the Reality, — not on the mere enunciation of empty words in which one finds intoxication. The ancients might legitimately find intoxication in the breath; we moderns cannot afford to find intoxications in words. Words must not be an entrancement for us, but something that is cherished in the spirit of the old Sophia — permeating man and filling him with living Wisdom.

These are the things through which Anthroposophy points out what is essential for the social life to-day. It would express something of this in its very name. *Anthropo-Sophia*, — that too is a kind of Wisdom. During the ancient Grecian time, the 'Man' went without saying. Sophia was a Wisdom of Man, for man was still enfilled with wisdom of light. To-day, when one says 'Sophia', people only think off science and scholarship — the ghost of Sophia. Therefore we need to appeal explicitly to 'Man', whom we summon with the word *Anthropos*: Anthropo-Sophia. We need to draw attention to the fact: Anthropo-sophia is something that proceeds from Man himself, shines forth from Man, springs forth and blossoms out of his noblest forces. Yes, we must point to this quite explicitly. Thereby, however, Anthroposophy also brings renewing life into man's Earth-existence. It is experienced by man — more spiritually, but no less concretely — as the *Sophia* was in olden time; while at the same time it will bring about what was then living in the whole human being: *Pistis*, the content of Faith. Anthroposophy is no mere content of Faith but a true content of Knowledge — albeit, that kind of Knowledge which gives people force and energy, such as in olden time was contained in Faith alone.

FROM NATURE TO SUB-NATURE

Rudolf Steiner

The age of Philosophy is often said to have been superseded, about the middle of the nineteenth century, by the rising Age of *Natural Science*. And it is said that the Age of Natural Science still continues in our day, although many people are at pains to emphasise at the same time that we have found our way once more to certain philosophic tendencies.

All this is true of the paths of knowledge which the modern age had taken, but not of its *paths of life*. With his conceptions and ideas, man still lives in Nature, even if he carries the mechanical habit of thought into his Nature-theories. But with his life of Will he lives in the mechanical science and industry to so far-reaching an extent, that it has long been imbued this Age of Science with an entirely new quality.

To understand human life we must consider it to begin with from two distinct aspects. From his former lives on Earth, man brings with him the faculty to conceive the Cosmic — the Cosmic that works inward from the Earth's encircling spheres, and that which works within the Earth-domain itself. Through his senses he perceives the Cosmic that is at work upon the Earth; through his thinking organisation he conceives and thinks the Cosmic influences that work downward to the Earth from the encircling spheres.

Thus man lives, through his physical body in Perception, through his etheric body in Thought.

That which takes place in his astral body and his ego holds sway in the more hidden regions of the soul. It holds sway, for example, in his destiny. We must, however, look for it, to begin with, not in the complicated relationships of destiny, but in the simple and elementary processes of life.

Man connects himself with certain earthly forces, in that he gives his body its right orientation within them. He learns to stand and walk upright; he learns to place himself with arms and hands into the equilibrium of earthly forces.

Now these are *not* forces working inward from the Cosmos. They are forces of a *purely* earthly nature.

In reality, nothing that man experiences is an abstraction. He only fails to perceive whence it is that an experience comes to him; and thus he turns ideas about realities into abstractions. He speaks of the laws of mechanics. He thinks he has abstracted them from the connections and relationships of Nature. But this is not the case. All that man experiences in his soul by way of purely mechanical laws, has been discovered inwardly through his relationship of orientation to the earthly world (in standing, walking, etc).

The Mechanical is thus characterised as that which is of a purely earthly nature. For the laws and processes of Nature as they hold sway in colour, sound, etc, have entered into the earthly realm from the Cosmos. It is only within the earthly realm that they too become imbued with the mechanical element, just as is the case with man himself, who does not confront the mechanical in his conscious experience until he comes within the earthly realm.

By far the greater part of that which works in modern civilisation through technical Science and Industry – wherein the life of man is so intensely interwoven – is *not Nature at all, but Sub-Nature*. It is a world which emancipates itself from Nature – emancipates itself in a downward direction.

Look how the Oriental, when he strives towards the Spirit, seeks to get out of the conditions of equilibrium whose origin is merely in the earthly realm. He assumes an attitude of meditation which brings him again into the purely Cosmic balance. In this attitude the Earth no longer influences the inner orientation of his body. (I am not recommending this for imitation; it is mentioned merely to make our present subject clear. Anyone familiar with my writings will know how different is the Eastern from the Western spiritual life in this direction.)

Man needed this relation to the purely earthly for the unfolding of his Spiritual Soul. Thus in the most recent times there has arisen a strong tendency to realise in all things, and even in the life of action, this element into which man must enter for his evolution. Entering the purely earthly element, he strikes upon the Ahrimanic realm. With his own being he must now acquire a right relation to the Ahrimanic.

But in the age of Technical Science hitherto, the possibility of finding a true relationship to the Ahrimanic civilisation has escaped man. He must find the strength, the inner force of knowledge, in order not to be overcome by Ahriman in this technical civilisation. He must understand Sub-Nature for what it really is. This he can only do if he rises, in spiritual knowledge, at least as far into extra-earthly Super-Nature as he has descended, in technical Sciences, into Sub-Nature. The age requires a knowledge transcending Nature, because in its inner life it must come to grips with a life-content which has sunk far beneath Nature – a life-content whose influence is perilous. Needless to say, there can be no question here of advocating a return to earlier states of civilisation. The point is that man shall find the way to bring the conditions of modern civilisation into their true relationship – to himself and to the Cosmos.

There are very few as yet who even feel the greatness of the spiritual tasks approaching man in this direction. Electricity, for instance, celebrated since its discovery as the very soul of Nature's existence, must be recognised in its true character – in its peculiar power of leading down from Nature to Sub-Nature. Only man himself must beware lest he slide downward with it.

In the age when there was not yet a technical industry independent of true Nature, man found the Spirit *within* his view of Nature. But the technical processes, emancipating themselves from Nature, caused him to stare more and more fixedly at the mechanical-material, which now became for him the really scientific realm. In this mechanical-material domain, all the Divine-Spiritual Being connected with the origin of human evolution, is completely absent. The purely Ahrimanic dominates this sphere.

In the Science of the Spirit, we now create another sphere in which there is no Ahrimanic element. It is just by receiving in Knowledge this spirituality to which the Ahrimanic powers have no access, that man is strengthened to confront Ahriman *within the world*.

(March, 1925)

*Further Leading Thoughts issued from the Goetheanum for the
Anthroposophical Society (with reference to the foregoing study:
From Nature to Sub-Nature)*

In the age of Natural Science, since about the middle of the nineteenth century, the civilised activities of mankind are gradually sliding downward, not only into the lowest regions of Nature, but even *beneath Nature*. Technical Science and Industry become Sub-Nature.

This makes it urgent for man to find in conscious experience a knowledge of the Spirit, wherein he will rise as high above Nature as in his sub-natural technical activities he sinks beneath her. He will thus create within him the inner strength *not to go under*.

A past conception of Nature still bore within it the Spirit with which the source of all human evolution is connected. By degrees, this Spirit vanished altogether from man's theory of Nature. The purely Ahrimanic spirit has entered in its place, and passed from theory of Nature into the technical civilisation of mankind.

RAPHAEL AND THE CLOUDS

Adam Bittleston

A great artist does not belong only among his contemporaries. He has deep roots in the past, and understands and loves ancient artists, perhaps much more than most of his contemporaries do. And it is no accident that he is appreciated – perhaps after an interval – more in later centuries than in his own time; fresh discoveries about the meaning of his work go on being made. For already in his lifetime he was a citizen of the future, and belonged to civilisations not yet dreamed of by others. Raphael was an artist of this kind, as were his great contemporaries Leonardo da Vinci and Michelangelo. But it is possible to overlook the prophetic element in his work, and regard him only as one in whom the art of the Italian Renaissance, and the devotion of medieval Christendom, reached their peak. But in order to discover the prophetic spirit in Raphael, and in particular the relevance of his vision to the twentieth and twenty-first centuries, we need to grasp something of the way in which human consciousness has changed from ancient times, and how it is changing today. We need to lift our minds into realms which seem remote, when the pressures of our time threaten to limit our understanding to things and processes which can be counted, measured, and weighed. The realms we need to enter, at first in our thoughts, but increasingly with our hearts and our vision, are much nearer than they seem. And we can find a guide through the historic development of human consciousness, and towards its ascent in the future, in Rudolf Steiner – a man before whose clear vision there stood the past, the present, and the future tasks of humanity.

He did not look at his work as something finished and complete, but as calling for effort and activity by all who approached it seriously. Because it brought together science, art, and religion, it has generally been disregarded by those who wish only to consider these as separate subjects. But the greatest artists have always sought knowledge, often in widely diverse fields, and are deeply religious, as their works show. In many of the paintings of Raphael this is wonderfully apparent, as in his treatment of clouds – on which a few tentative comments will be made here.

Clouds are mainly regarded today as objects for meteorological and physical study; what art and religion may have to say about them is not taken seriously. And yet they provide an outstanding example of the change in human consciousness during the past two millennia. At the time when the books of the New Testament were written, about 50 to 120 AD, it was something quite natural that in encounters between the Divine and the





2. Madonna Di Foligno



3. Vision of Ezechiel



4. La Disputa

human the realm of the clouds could be a kind of border country, mediating between the invisible and the visible. At the Ascension, the Christ is received into a cloud, vanishing from the disciples' sight. About a year earlier, three of the disciples are led up a mountain and see Christ transfigured, his countenance and garments shining; and from a cloud about them a voice speaks: 'This is my beloved Son, hear him'. (Only very rarely in the New Testament are any words ascribed directly to the Father God). These accounts do not come from 'ignorant, superstitious men'. The Ascension is described in this way only by Luke, the 'Beloved physician', a man deeply imbued with Hebrew and Greek culture, in the first chapter of the Acts of the Apostles. Accounts of the Transfiguration are found in Matthew, Mark, and Luke. These events should not be dismissed as legendary; what really nourishes human souls, as the New Testament has done for centuries, needs to be *understood*; and this can only be done if we take into account different levels of consciousness, through which access to different levels of reality is achieved. Through the study of Rudolf Steiner's work we come to recognise that impressions gained by the physical senses do not in themselves convey reality (something of course which has been recognised and acknowledged in the East for thousands of years). As our immediate experience tells us – if we are willing to listen to it – the reality of a human being is a freely active spirit, not a measurable object. The realities behind what we see and touch as stones, and plants, and animals, are also spirits – but in order to know these we have to develop the right kinds of consciousness. It is difficult to describe them in ordinary language. Rudolf Steiner was always seeking words which could convey some impression of supersensible reality – and was very aware of the difficulties of this task. Often he used words which come from some ancient tradition, from the Sanskrit, from Hebrew and Greek. He deeply valued the Christian tradition contained in the writings of 'Dionysius the Areopagite' (writings written down, in all probability, centuries after the lifetime of the disciple St Paul), which speaks of nine hierarchies of spiritual beings – from those nearest to man, the Angels, to those nearest to God, the Seraphim. Dionysius gives the nine hierarchies seven Greek names: Angels, Archangels, Archai, Exousiai, Dynameis, Kyriotetes, Thrones, – and two Hebrew names, Cherubim and Seraphim. The Exousiai, Dynameis and Kyriotetes are often called by Rudolf Steiner 'Spirits of Form, of Movement, and of Wisdom'. He goes far more into detail about the functions of each hierarchy in nature and in the heavenly bodies than Dionysius does.

A striking characteristic of Rudolf Steiner's vision of the world is that he regards the greatest of the hierarchies as working most deeply into physical events. In this respect he distinguishes among the hierarchies three groups of three. He calls the Angels, Archangels and Archai 'Spirits of Soul', the effects of whose activity are seen particularly in individual human feelings and the development of nations and civilisations. The Spirits of Form,

Movement and Wisdom are 'Spirits of Light', manifesting in the life and growth of plant, animal, and man. Thrones, Cherubim and Seraphim, forming together the First Hierarchy, are 'Spirits of Strength' – in German 'Kräftegeister'. They manifest their power in the elements of earth, water, air and fire – and most directly, in the clouds. This may seem at first sight a contradiction, for clouds appear to us impalpable, evanescent entities. We forget that without the moving clouds there would be no life on the earth at all. The clouds have the power in them capable of transforming a whole landscape; without them it would become a desert. Their lightning and thunder encircle our planet, above all in the tropics, where most of the 40,000 thunderstorms occur (according to one reckoning) which rage every day somewhere on earth and purify the atmosphere.

When Raphael painted events from the New Testament, his pictures could not have been so powerful, had he not believed with his whole soul that the Gospels describe real happenings – real in the deepest sense, not in the sense 'physically perceptible'. He knew that a materialistic, onesidedly quantitative conception of the world was well on the way in his own time, and could come in the future to dominate the world until it was overcome. And he looked forward to the great visions many human beings would be granted, when the promise contained in the Acts of the Apostles would be fulfilled. Luke tells how forty days after Easter, when many disciples were assembled high on the Mount of Olives, the Christ charged them to be his witnesses 'in Jerusalem and in all Judea and Samaria, and to the end of the earth'.

'And when he had said this, as they were looking on, he was lifted up, and a cloud took him out of their sight. And while they were gazing into heaven as he went, behold, two men stood by them in white robes, and said "Men of Galilee, why do you stand looking into heaven? This Jesus, who was taken up from you into heaven, will come in the same way as you saw him go into heaven".'

The two men in white robes are described by Luke in words similar to those used by him in his account of the Transfiguration (Luke 9) where they are named Moses and Elijah. This was the subject of the very last great picture painted by Raphael. There two distinct events are brought together. In the upper part of the picture, to the left, is shown the summit of the mountain, with the three disciples, Peter, James and John, fallen to the ground, and above them, surrounded by cloud, not touching the earth with their feet, Christ between Moses and Elijah. The upraised arms and gaze of the Christ are very much as in representations of the Ascension by other artists. In the lower part of Raphael's picture, to the right, is a scene of great tension at the foot of the mountain, (Luke 9, 37-43). A boy tormented by a spirit has been brought by his parents to the other nine Apostles, but they are unable to heal him, and are thrown into confusion. The mother of the boy, kneeling in the foreground, is a magnificent figure, dominating this

part of the picture; she demands help, rather than appealing for it.

From the cloud above the mountain of the Transfiguration Christ is to return forthwith, and heal the boy. From the cloud above the mountain of the *Ascension* Christ is to return, but not at once. Over a long period of time he will show Himself rarely. And then he will come to many – and has already come – when they are in need, often when there seems to be no human remedy. His coming brings inexpressible comfort; but this renewal of spiritual perception will also present many with deep problems. It is not easy for our souls today to see how cosmic power and human gentleness can be combined in one being. Raphael's pictures help us, not to formulate a theoretical answer to this problem, but to feel how it is answered by the reality of which we are part.

Two pictures, in both of which the realm of the clouds is significant, manifest deeply contrasting aspects of the Divine. One is the Sistine Madonna, the most famous of all Raphael's paintings (now in Dresden); the other is the 'Vision of Ezekiel'. Raphael's pictures of the Madonna are given other is the 'Vision of Ezekiel'. Raphael's pictures of the Madonna are given different settings. Sometimes she is sitting in the open among green fields, sometimes enthroned within a building, sometimes with a hardly differentiated dark background. But in the Sistine Madonna she is floating upright in the clouds, bearing her child in her arms, on each side of her a saint – an aged man and a young woman, St Sixtus and St Barbara. In the clouds there are the heads of many winged children, very delicately painted.

The face of Mary in the Sistine Madonna can hardly be described. Perhaps this can best be attempted by saying what it is *not*. There is nothing at all in it that is hard, and also nothing at all that is under the influence of wishes. And if we think of many other Madonnas painted by Raphael, we may find in them all this freedom from anything hard, or anything controlled by desire.

The scientific knowledge of recent centuries was inspired by a true quest for objectivity, for detachment from any kind of prejudice – but it has not known how to pursue objectivity without growing hard, and in its hardened form has fostered a technology which serves not only real human needs but countless desires and emotions endangering humanity. While this has happened, a longing has grown up in many hearts for a renewed vision of the Mother of Jesus. And she will appear to many as Raphael painted her, coming forth from the clouds.

There is another picture by Raphael, which has much in common with the Sistine Madonna – the Madonna di Foligno, painted it seems in the previous year, 1512. Here too, Mary and the child are surrounded by a cloud, in which a multitude of winged children appear. The venerating human beings are on earth, standing or kneeling; they are a fully grown but youthful John the Baptist, St Francis, St Jerome, and the donor of the picture, which was probably completed after his death. All four men show on their faces something of the grief and anxiety life has brought them.

Behind them, across green fields, is a town; above it, a rainbow shines. There is one striking difference from the Sistine Madonna. In the Madonna di Foligno, Mary is encompassed, within the cloud, by a radiant sun-disc. Like the vision of a Woman in the 12th chapter of the Revelation of St John, she is 'clothed with the sun'; in St John the Woman has 'the moon under her feet and on her head a crown of twelve stars. Her child is not yet born; and she is threatened by a dragon who intends to devour it. Michael, the Sun archangel, protects her and throws down the dragon. St John, the writer of the Revelation, when imprisoned on Patmos towards the end of the 1st century, has this vision of an event lying then far in the future. When Raphael paints the Madonna surrounded by the sun-disc, amongst the clouds, it is again a prophetic vision, looking towards our time.

In all Raphael's paintings of the Madonna, the qualities of the greatest members of the First Hierarchy, the Seraphim, are expressed: limitless wise love and gentleness, far beyond human words. But in 'The Vision of Ezekiel' a giving of blessing is expressed, which has a different character – of limitless power and authority. The First Hierarchy are shown in their service of the Father, who is surrounded by the Four Living Creatures – Lion, Bull, Angel, and Eagle, represented in the Zodiac by Leo, Taurus, Aquarius and the unhappily named Scorpio. Raphael's picture does not draw only on the first chapter of Ezekiel, but also on the fourth chapter of the Revelation of St John. Here the Living Creatures (in Greek Zoa) are around the Throne of God – from which issue 'Lightnings, and voices, and peals of thunder' – and 'day and night they never cease to sing

Holy, holy, holy
 Lord God Almighty,
 Who was and is and is to come!

Raphael's imaginative perception shows here the Living Creatures in the realm of the clouds, singing a song so majestic that the human soul can hardly endure it, as before the grandeur of storm. Clouds can bring not only the blessing of gentle rain, but also downpours which sweep away the soil and leave devastation. The book of Ezekiel, and the Revelation of St John, talk often of the wrath of God. Not for nothing does Raphael represent below the Father-God a mighty tree growing from the earth with its crest in the clouds; a tree which can receive and use downpours unshaken, like a soul able to recognise in what seems the overwhelming wrath of God a boundless love.

A few years ago there were two middle-aged women sitting in the late evening in a small room, to whom the sense of the presence of Christ was given: one of the women was so terrified that she begged her friend never to speak of their experience, the other felt blessed by it for the rest of her life. (Only through unusual circumstances did the event come to be known; the detailed account of it has the ring of truth).

There is an instrument which can speak with a voice of thunder and can also give a gentle accompaniment to a little choir: in Raphael's time its invention was described to St Cecilia, the patron saint of Music, who was martyred about AD 176. The forerunner of the organ, which is called the hydraulus (because the air was pushed through the pipes by water), had been played by the Jews for many centuries in religious ceremonies, and for a time in imperial Rome. The organ emerged in the Western church gradually as an instrument accompanying singing in the Mass and other services, particularly in periods when other instruments were only used on secular occasions. In Raphael's beautiful and very harmonious picture of St Cecilia, she stands with a small organ in her hand, looking up through a break in a dark blue layer of cloud. She is listening to angels singing in a sea of golden light, with musical scores in their hands. Here Raphael returns to a theme used some years earlier by his friend and 'Master' Perugino, in an altar piece of which part is now in the National Gallery, London: 'The Virgin & Child with St Michael and St Raphael'. Here, above the Mother of Jesus three angels are standing on a very delicate layer of white cloud, with musical scores in their hands. At the time when this picture was painted, about 1499, there seems to have been a strong reciprocal influence between Perugino and Raphael; contemporaries said of some of their pictures that they could hardly tell which of the two had painted them. Though Perugino was more than thirty years older, Raphael never lost any of his own individuality and mastery through contact with him; it was as if they shared a common inspiration, which led Raphael further during his last years in Rome.

In the 'St Cecilia' there are two figures standing on each side of her: on the left (from the onlooker's point of view) St Paul and St John: the Evangelist, on the right St Jerome and St Mary Magdalene. Raphael invests each of these figures with extraordinary beauty and significance. St Paul is looking downwards towards the earth, deeply pondering, his fingers only lightly touching the handle of his sword. St John and St Jerome seem to be looking across at each other. Only St Mary Magdalene is looking straight out of the picture at the onlooker; her face is serene, but there is in her eyes something like a question or a challenge. On the ground in front of the group are instruments, partly broken, of the kind used mainly in previous centuries for secular music.

From the golden realm just above the clouds comes the music which St Cecilia hopes will be supported on the earth by the organs which are near to her heart. St Paul knows heavenly music well; when cast into prison with Silas, they sang there all through the night. From the Heights come tones which purify the soul; but what of the Depths? In an earlier picture by Raphael, the Coronation of the Virgin, St Paul also looks downwards, into the sarcophagus where the body of the Mother of Jesus had lain. From this lilies and roses spring, while above the clouds she herself, with bent head, is crowned by Jesus. St Jerome in his lifetime had written scathingly about the

flute and the lyre; perhaps now he looks to the younger man, St John the Evangelist, the beloved disciple, for guidance. St Jerome had nobly served the Word, translating the Bible from Hebrew and Greek into Latin, making the version so long recognised in the Western church, the Vulgate. From this many verses have been set to magnificent music. St Mary Magdalene had had a terrible experience of the dark spirits of the Depths, being possessed by seven devils before Christ drove them out – and had, on Easter morning, the meeting with him in the garden of the sepulchre, after he had overcome in the Depths the powers of death and of evil. From the garden he had sent her back to the disciples to tell them what had happened – to work in the Midst, the level of human beings side by side. It is part of the wonderful composition of 'St Cecilia' that it embodies this great cross between the vertical, the relationship between the Heights and the Depths, and the horizontal, between human beings.

When Rudolf Steiner, in November 1923, gave his Dornach lectures containing the Imaginations for the four seasons and their power to inspire the arts, he spoke of music in particular when he came to mid-summer. Here he describes how the Mysteries of the Heights, the Midst and the Depths sound out in cosmic music. Human musicians have to learn to hear this; heavenly Thoughts in the Golden Heights, Conscience guiding the human will in the Depths, mingling in the Midst to manifest the Son. Some eight months later Rudolf Steiner returned, for the last time, to the future task of music, in lectures given in Torquay in South-west England. Here he shows how human beings in the future will learn to hear in the musical intervals – the seventh, the fifth, the minor third and the major third – the way of Christ from the heights of heaven into incarnation, and through death to Resurrection. It will be possible for earthly music to come about which will contain the power and wisdom of the Mystery of Golgotha.

What was expressed by Raphael in colour and form will one day be expressed in music. Through the art of painting there approaches us in gentle quietness the outstreaming loving-kindness of the Seraphim. The wise and holy speech of music comes to us, as Rudolf Steiner has described, from the region of the Cherubim, while poetry and drama are inspired by that of the Thrones.

In the border realm of the clouds the great Hierarchy of spirit-beings encounter also the adversary powers – from the darkness of the Depths Ahriman, who infects the human soul with fear; from above, the proud spirit Lucifer – though he is on the way towards redemption. Those human beings who open the doors of their hearts to Christ can serve him in strengthening a good kingdom in between, which blesses the life of the earth.

One of the greatest of Raphael's pictures represents this kingdom of free spirits, beneath and in the midst of the clouds. It is the fresco which received, through a misunderstanding many years after Raphael's death, the

name 'Disputa'. Raphael was well able to represent a violent or a fierce argument; but this painting breathes the atmosphere of a great community, united in adoration, composed of very marked individualities. But even the group on the ground with the most tension, traditionally called 'The Heretics' honour the altar.

The fresco shows four levels of existence, with layers of cloud between them. On the ground sit or stand saints or fathers of the church, Popes and clerics, monks and learned men. Above the lowest layer of cloud are twelve great witnesses of the Old and New Covenants, whose bodies appear brighter, more translucent for the heavenly Light. Among them are Peter, Adam, John the Evangelist, and David holding his harp, (these last two communicating deeply with each other), Stephen, Moses, Abraham and Paul. (The other identifications seem less certain). A little higher, in the centre, is Christ between Mary and John the Baptist; above them, God the Father in the midst of clouds containing many partly visible beings.

On the ground in the centre there is an altar, being a monstrance with the consecrated Host; and immediately above, the Dove of the Holy Spirit descends, between four winged children holding the four Gospels. Through the consecrated Host, the vision of earthly human beings is led upwards, passing the layers of cloud, encountering the descending Spirit and the word of the Gospel, reaching through the realm of blessed souls to the Son and the Father. The four levels of existence represented in this fresco can be compared to the four levels of consciousness of which Rudolf Steiner speaks – sense perception, with the thinking which is attached to it, Imagination, Inspiration, and Intuition.

How is it that the consecrated Host can provide such a door into spiritual realms? Many times Rudolf Steiner said that the laboratory table must become an altar, if scientific research is to develop rightly. When the researcher lifts substances above his table, he needs the same reverence as the priest raising bread and wine above the altar, praying and giving thanks. Without reverence, as he accumulates data in a computer bank, and relates these data with his thinking, the scientist is led only into the realm of Ahriman. If reverence carries his thinking towards Imagination he achieves perceptions which help him to find in the things of Nature manifestations of spiritual beings.

Nothing that can be done with physical things is really neutral morally. Every technological development harms or helps those elemental beings who benefit the plants. And they are affected not only by large-scale changes in technology, which bring much of Sub-Nature into our daily experience, but by the moods of ordinary people when dealing with material things. So long as we regard what we use as nothing but 'things', objects about which we need not have any special feelings, we are dragged into a blind service of Sub-Nature. When we approach all substances with veneration, and all technology – down to the simplest washing machine or vacuum cleaner –

with a sensitivity willing to ask what it means for the world of elemental beings, we shall begin to find our way on the one hand towards the great community of spirits, and on the other hand to the realm of Ahriman. It would be quite nonsensical of anyone on earth today to say 'I will have nothing to do with Ahriman'. We should not withhold, as Rudolf Steiner wrote in 'Knowledge of the Higher Worlds', even from definite evil, our 'intelligent sympathy' – difficult though this may be. But in order to meet and control technology we have to guide our spirit into regions as much above Nature as the Sub-Nature from which technology comes is below it. And into these regions Raphael shows the ways – through the sacrament of the altar, which will be needed by human beings and by the positive elemental beings until the end of the earth, and through consecrated human thought.

HO!

Charles Austin

Ho!
 This is the wind of Spring!
 Ho ha!
 This is blood wind
 sap wind spawn wind
 joy wind wiping the sky slate clean.
 Come at last cleanser.
 Come, if late, purifier.
 Sweep aside, wipe out
 winter black care-worn.
 Fling aside, override
 winter cold, cobwebbed.
 Ah bring us young wind,
 reviver, reborn wind,
 redeemer, resurrection wind,
 death of death wind,
 Christ wind alive.
 Ah come!

AN EYE FOR THE SKY

A tribute to Michael H. Wilson 1901-1985

Ralph Brocklebank

Although a musician by training and profession, who had also made important contributions to curative education and to esoteric studies, Michael Wilson felt that the major theme in his life had been the understanding of light and colour. In this connexion he had developed a remarkably keen eye for observing and recording the ever-changing patterns and effects of sky and cloud, sunbeam and shadow, dawn and dusk, and all the phenomena of the atmosphere.

As a child, Michael always wanted to know how things worked, and this applied as much to the world about him as to things he could actually get his hands on. He liked to watch the processes of sunrise and sunset, and set down what he saw in watercolour sketches. His talent for painting was enhanced by his mastery of the technique of the controlled, full-bodied wash, with which he could depict a complete cloudspace in one quick 'visit' to the paper. Having sketched in the outline of the scene, he would plan in his mind's eye exactly how the finished sky should appear, then load the brush with liquid pigment and apply the paint to the paper with swift but careful strokes, gathering and spreading the colour until the whole sky had been covered and modelled to give the result he had planned. The landscape could be filled in with more leisurely washes later. Michael's watercolours have been likened to stage scenery – there are no figures nor much foreground detail; all the drama comes from the sky where the cloud formations create the activity and set the mood.

Another of Michael's childhood hobbies was photography, and here too he soon mastered the necessary techniques, making colour prints long before colour film could be bought off the shelf, and experimenting with each new process as it became available. When he went in for mountaineering, he climbed with two cameras, one for colour and one for monochrome. His collection of slides covers practically every effect of colour and lighting to be observed in the hills and mountains. One of his favourite books (and one he warmly recommended to enquirers) was M. Minnaert's *Light and Colour in the open air* (G. Bell, London, 1940), and he prided himself on having seen every phenomenon recorded by Minnaert.

The life of a mountaineer depends upon an understanding of the weather, and as Michael climbed he not only recorded the visible effects but learned how to interpret them. His knowledge of clouds was put to a more intimate test when he took up gliding in the fifties. From his home in Clent he would look out to the westward every morning, where the ridge of the Longmynd can just be seen on the distant horizon, and he would read the sky to see whether it would be a good day for riding the thermals. If it was (and if he could get away), he would take his camera and soon be soaring on the air-currents and literally getting to know the clouds from the inside. One effect he managed to catch on film was the eerie illumination just below cloud-base, where the main source of light is the reflection from the green mantle of a sunlit earth beneath.

Michael is probably best known for his work with Goethe's Theory of Colours. His exploration of the reflection of light from coloured surfaces was just one of the directions in which he expanded and developed Goethe's original contribution. Implicit to Goethe's approach was the recognition of polarity in the opposing actions of lightening and darkening. This is most commonly illustrated with reference to the atmospheric colours. If one looks toward the sun, its light is seen through the air, which serves to darken it; as the sun sinks nearer the horizon, its light passes through ever thicker oblique layers of air, darkening it towards yellow, then orange, and finally perhaps to red. On the other hand, if one looks away from the sun, the illuminated air serves as the element of light, and through it the darkness of space, or even the dark shapes of distant hills, appear bluish; again there is a sequence of hues from a lighter more greenish blue to a deeper more purplish shade as one passes from horizon to zenith. Thus the primary polarity of light and dark gives rise to a second polarity of dynamic colours, warm yellow and orange hues on one side and cool blues on the other. These atmospheric colours have their counterpart in the prismatic edge-spectra, and Michael showed how the use of soft, graduated edges in place of sharp boundaries between black and white, gave gentle atmospheric colours with the prism, much more akin to the colours we see in the sky than the brilliant spectral colours usually produced.

Goethe describes a third polarity in the drama of the birth and death of colours. In the prismatic experiments, this arises when the two bands of yellowish and bluish colours are brought together in two contrasting ways. If the yellow and blue are made to darken each other by excluding the intervening light, they overlap to make green. This gives the familiar spectral sequence of the seven colours. The process is parallel to the mixing of green from blue and yellow paint, where each pigment darkens the reflected light by removing some of the light not darkened by the other; the resulting colour is what is left of the light when both pigments have done their darkening deeds, and the process is nowadays known as subtractive mixing. The contrasting process, known as additive mixing, also has its counterpart

in the prismatic experiments. This time the yellowish and bluish bands are brought together back-to-back, as it were, so that the darkness is excluded and the colours overlap to lighten each other. At first the deep blue-violet and orange-red fringes meet and make a powerful purple; then as the overlap becomes more extensive, the central colour lightens through magenta red to a delicate pink, eventually fading away into light as the overlap is completed, with the merest hint of a yellow at one side and a trace of palest blue at the other. This final sequence is the true complement of the rainbow spectrum, and when Goethe contemplated the culminating polarity of the drama of colours, he said that he could not help but think of the greens on the one hand and the reddish purples on the other as representing the earthly and heavenly creations of the Elohim – a quotation Michael would use to good effect in his lectures.

When Michael set out to explain these colour processes to people, he came upon a strange paradox. Everybody accepts that yellow and blue make green. It is certainly true in watercolour painting, and teachers of young children may try to enhance the dramatic impact when a wash of yellow first passes over one of blue to make a new colour on the paper. Yet this effect is hardly ever seen in nature – in the rainbow the green is there already, in the middle between the other colours, and one cannot see it arise from the overlap of blue and yellow. The plant world gives us innumerable shades of green, but all from green pigments, never from the mixture of blue and yellow. (For the record, when yellowish water from a mountain river enters the bluish water of the sea, greenish water results from the mixture, but few people seem to have observed this, and in any case the colours are very weak.)

In contrast, any demonstration of additive mixing, whether done with pure prismatic colours or more conventionally by using coloured lanterns, seems to take people by surprise. They are often delighted and amazed by the results, sometimes even refusing to believe what they see. And yet these effects are everywhere about us in nature and are frequently seen in the sky. When clouds are lit by the yellow light from a low sun to one side, and by the blue reflection from the sky to the other side, the mixture of blue and yellow does not give green; this is an addition of lights, and the resulting colour is a glorious pink. The same is seen on snow-capped mountains at sunrise or sunset, when the light from sun and sky is in balance, giving powerful rosy pink colours. (People who think that these pink tones must arise from a red sun should turn and check the source of light at the next opportunity; it may be a bit orange, but is more usually a warm yellow.)

Michael struggled hard to convince people that additive mixtures were a part of nature's pageant, and not just clever tricks done under laboratory conditions with sophisticated apparatus. He had an extensive range of slides to illustrate colour effects in the sky, and to encourage people to observe these things for themselves. He also devised many simple demonstrations,

such as the 'Window sill effect' in which a white-painted sill is illuminated from outside by the fading blue sky and from indoors by yellowish tungsten light; there comes a moment when the two sources are in balance and the most delicate pink colour results. Or one can observe the reflection of a yellowish room lamp on the window glass with the dimming blue sky beyond, and again the reflected lamp is a beautiful pink colour. Michael also experimented with stage lighting filters in projector lanterns, and showed beyond a doubt that, from a wide range of varying blues and yellows, most pairs would make some sort of green when mixed subtractively (that is, with both filters over the same lantern), while most pairs made pink when mixed additively (each in a different lantern and the two light beams overlapping on a screen). As anyone familiar with watercolour paints would expect, cool blues and yellows make good strong greens while warm blues and yellows (Ultramarine and Chrome Yellow, for instance) make very poor greens, very dark and muddy. Naturally, quite the opposite is true for additive mixes. This time it is the cool hues which produce very little colour, though since we are now adding lights, the results are almost white. Only when the blue or yellow or both become warmer in tone does the result become pinkish, and an ultramarine coloured light added to a chrome yellow light gives a very strong pink hue. Michael showed that the same pair of filters, one a typical blue, the other an average yellow, would give a good green by subtractive overlapping and a marked pink when added as lights. He called this the 'Pink-Green Paradox' and saw it as the final culmination in Goethe's drama of colours. Yet though yellow light and blue light are forever creating pink and reddish colours in the sky and cloudscape, and never green, this magnificent gesture of nature's goes strangely unremarked.

Michael's studies in the field of colour did not merely repeat what Goethe had said and done, and he did not regard his Theory of Colours as the last word on the subject. But he did find Goethe's method of observing the phenomena and allowing them to speak, so that one could come to understand what was happening, to be good science. He developed a Goethean approach to many complex problems, such as the appearance of coloured objects in coloured light, the question of the penumbra and the pinhole image, and the relation of image to object with lenses and concave mirrors. Many of these laboratory effects have their equivalent in the open air, as a reference to Minnaert's book will show. But Michael became increasingly interested in going beyond the mere appearances, the happenings in nature, and began to investigate the process of perception itself. He did not stop at the mechanism of vision, but made a deep study of the whole philosophy of perceiving, of knowing the world, relating what he had learned from his Goethean science to what Rudolf Steiner had to say in his *'Philosophy of Freedom'*. This goes beyond the realm of the colours and forms of the clouds in the sky, but Michael never regarded these phenomena of nature as mere illusions, irrelevant effects in our sense organs produced



1 A & B Two views in Skye. Watercolours, Michael Wilson 1943.



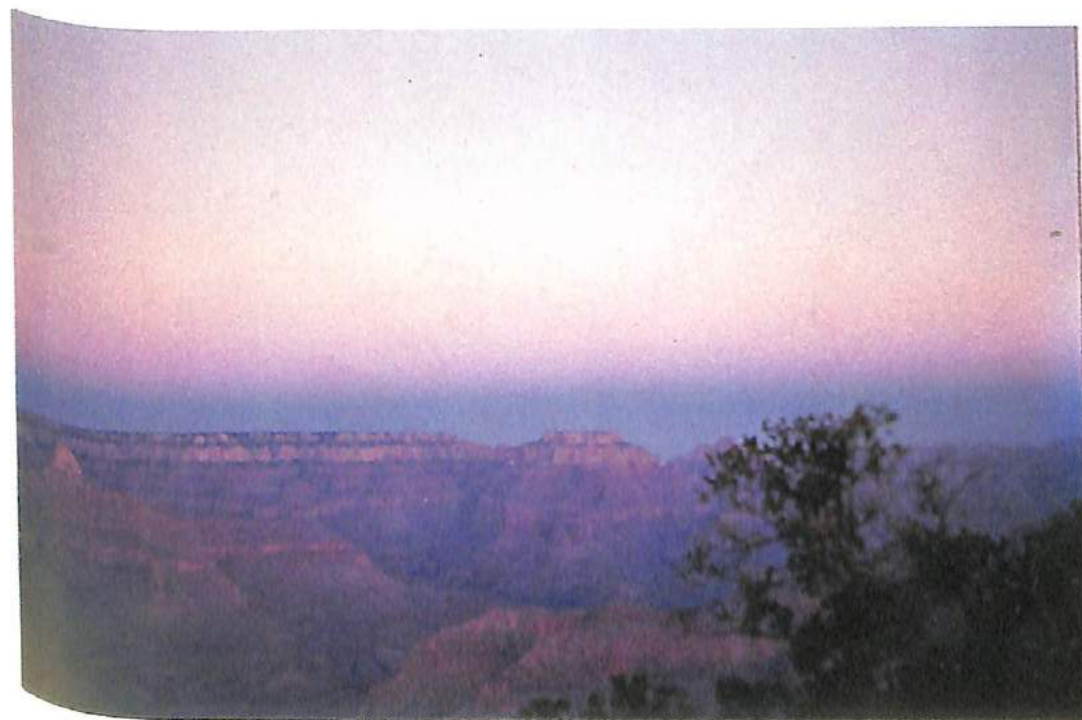
2 A Shropshire from beneath cloud base. Photograph from glider, June 1956. Green reflected light.



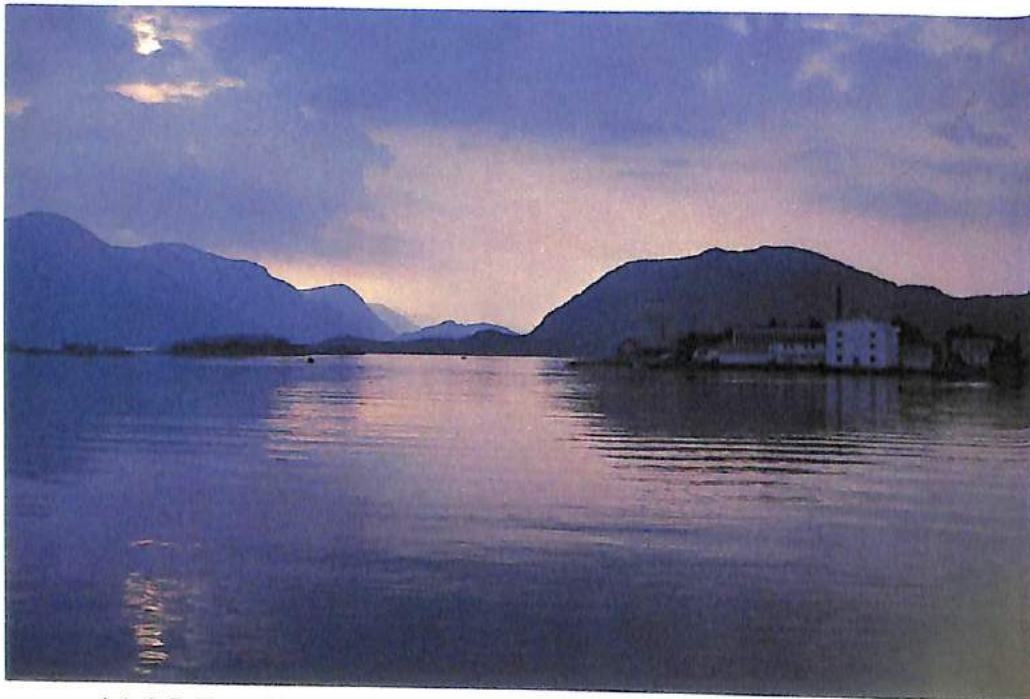
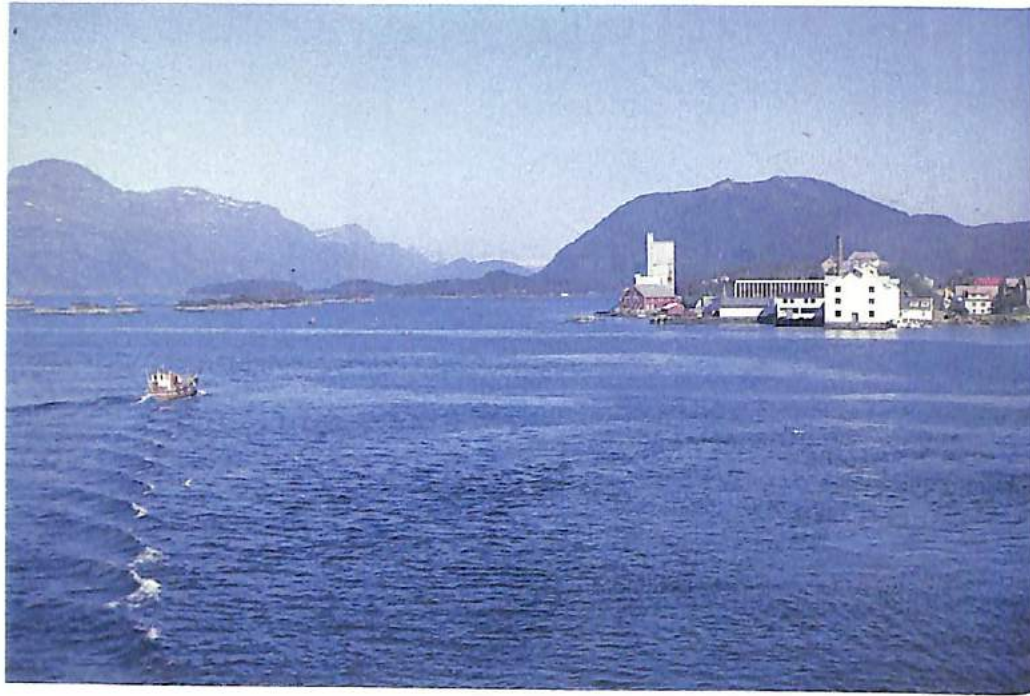
2 B On the Longmynd, July 1955, mid-morning. Wave clouds.



3 A Sunrise in Wales, Easter 1959. Pink sky reflected in tarn.



3 B The Grand Canyon, Colorado, November 1957. The earth's shadow rising in the east just after sunset.



4 A & B Florø, Norway, June 1968. Two moods, 'major' and 'minor'. These were the pictures used for the musical demonstration.

by an unknowable outer reality; rather did he come to see them as metaphors for the real strivings of spiritual beings, a language that one could learn to read, written in the handwriting of those dynamic forces that shape the world. Thus Goethe's poetic picture can become a reality, and we may come to know the deeds of the Elohim, the Gods of Creation.

As an illustration of Michael's ability to combine the qualities of the hard-thinking philosopher, the observant scientist and the sensitive artist, there is an episode in his life that might well be better known. He was asked whether his understanding of the Goethean method could not be combined with his knowledge of music to produce a Goethean Theory of Sound. Michael had been a professional violinist of the first rank, and his study of composition at the Royal College of Music had been put to good use in the wide variety of instrumental and vocal pieces he had written for the curative educational work at Sunfield Children's Home in Clent. In his compositions he had made use of a polarity that had been pointed out to him by Eugen Kolisko, a Goethean scientist who taught zoology at the Waldorf School in Stuttgart in Rudolf Steiner's time; this is the polarity of rising in the major and falling in the minor, and Michael developed the kernel of this idea to comprehend virtually the whole of the theory of musical harmony – not perhaps a complete theory of sound in the Goethean sense, but certainly a contribution.

Now, in response to this request, Michael turned again to music, and the result was in fact the last piece of music he composed. He had never seen much point in making close analogies between sounds and colours, and was ever mindful of Goethe's picture of 'two rivers which have their source in one and the same mountain, but subsequently pursue their way under totally different conditions in two totally different regions, so that throughout the whole course of both no two points can be compared'. That the two rivers flow into one sea may be interpreted as a picture of the emotional sea of feelings to which both senses contribute, but the high peak from which both flow is more of a puzzle. Goethe speaks only of a higher law or formula, the general principles of physics, and expresses the hope that some day this might be supplied. While not attempting to provide any sort of universal law or theory, Michael believed that a presentation through the arts might be able to indicate the nature of those dynamic forces which underlie our experience of sounds and colours alike. And so he picked up his violin for the last time.

He wrote a pair of preludes for violin and piano, the first being based on the harmonic series that gives rise to the common chord and diatonic scale in the major key. While this was being played, with its confident melodies and forceful harmonies, a landscape scene was projected on the backcloth, a scene in full morning light, illuminated from behind the observer so that hills and houses, waves and clouds were all brilliantly lit and seen for what they were. The second piece was an exact polar opposite or reciprocal of the first

piece, in which the intervals, instead of rising from a common fundamental tone in the deep bass, fall from a common note high in the upper reaches of the gamut. This gives an ethereal quality not unlike a minor key (indeed, technically it is a minor key). While this second prelude was being played, the projected landscape was changed to a picture of the same scene, but this time taken in the evening so that the objects are seen against the light, shadows silhouetted against a background of swirling clouds. Whereas in the major mood the observer's attention is focussed on the objects, physically present, in the minor mood the objects become mysterious shapes, ethereally hidden in the chiaroscuro of the atmosphere. In the major mood one is standing foursquare in the present world; in the minor, one is yearning for a world half-lost, half-forgotten. This polarity of mood between the confident and the nostalgic was felt by Michael to be a fundamental archetype of our whole experience of life, a 'high peak' that might incarnate in the world of music or in the world of light and colour, or indeed in any other realm where we choose to be creatively active.

This last violin performance by Michael, with Duncan Steels as pianist, was played in the new Sunday Service room at Sunfield, which had been recently completed to Michael's design, and illustrated with photographs that he had taken in Norway. As an example of the combining of the arts it hardly compares with a Wagnerian opera, yet it contained the germ of something new, something precious that Michael was uniquely qualified to give. It may be seen as Michael's offering to the future.

Summer Solstice, June 1986

THE WEARER OF SHAPES

Goethe's Study of Clouds and Weather

Arthur G. Zajonc

We may picture Goethe in 1825 before his window, old but erect, his 'Jupiter-like eyes', as Schopenhauer had called them, intent upon the sky. As often in the past, he pondered the shapes and colors of the atmosphere, followed the ever-changing forms of cloud, and the hues and shadows of landscape and sky. As a young man he had ridden across the countryside with sketch pad or paints to experience and re-experience the landscape. His many drawings and studies had helped sharpen his sight so that his powers of observation were legendary. He had by now become the Weimar weather-prophet. The many visitors who streamed through his chamber, however, came to see him not as naturalist but as author and poet. Goethe's poetry, novels, and remarkable play *Faust* has brought him world acclaim. As a young man of twenty-five he had captured the mood of his era in his romantic novel *The Sorrows of Young Werther*. But Goethe as he stood now before his window, a man of seventy-six years, had changed greatly since those days of 'storm and stress'. To his secretary Eckermann he often said,

As for what I have done as a poet I take no pride whatever. Excellent poets have lived at the same time as myself; poets more excellent have lived before me, and others will come after me. But that in my century I am the only person who knows the truth in the difficult science of colors – of that, I say, I am not a little proud, and here I am conscious of a superiority to many.

His *Farbenlehre*, a theory or doctrine of color, had been a labor of many years and stood in Goethe's mind at or near the top of his many achievements. Yet this work, together with his many writings in botany, biology, geology, and meteorology, has been ignored, considered by most a curious blind alley in the history of science. We, by contrast, will investigate those efforts, in an attempt to begin to unearth the extraordinary riches that lie within his scientific work and, most especially, his methodology.

If we wish to explore and discover the character and method of Goethe's scientific studies we may fruitfully focus on a single field of his endeavors. In this article I have chosen meteorology, in part because his work in this area is less well known than his color or botanical studies, but also because it is a work of the mature Goethe, undertaken only after his scientific views had fully developed. Although Goethe did not see his meteorological

investigations as complete, they offer us a wonderful panorama of his manner of research and thinking. By studying them we may come to know Goethe better as both poet and naturalist.

The very beginnings of Goethe's interest in atmospheric phenomena date back to at least his Italian journey of 1786, but it was not until 1815 that he began their serious study. What invigorated his otherwise sporadic concern was the marvellously lucid essay by Luke Howard (1772-1864) 'On the Modifications of Clouds', which first appeared in German at that time. Howard, a chemist by profession, had often turned to the sky as an attentive observer. In his essay he presented a description of the structure of clouds and 'their manner of aggregation'. The general causes of atmospheric phenomena may be hidden, he wrote, but the form and movements of clouds 'are commonly as good visible indications of the operation of these causes as is the countenance of the state of a person's mind or body'. By his own frequent observation of the heavens he sought to combine the sky-watching experience of mariner or husbandman with the methods of natural philosophy. He hoped to explicate what remained for the weather-wise peasant an incommunicable skill. In order to do so he distinguished the basic cloud formations and gave them the names we use to this day: cirrus, cumulus, stratus, etc. For these distinctions Goethe was enormously grateful. 'I seized Howard's terminology with joy', he wrote, 'because it provided me with a thread I had till then been missing'. For the next two years he applied and tested Howard's classification against his own observations, which he recorded in his 'weather diaries'. Goethe felt that he had found in Howard a kindred spirit. Here was a man intent upon nature herself, a man whose gaze could move through the heavens resting upon each formation gently and discerningly. Goethe had expressed the ideal of such observation years earlier in connection with his studies in botany: '... and like the sun that calls forth and illuminates each and every plant, the botanist too must observe and survey them all with the same calm glance, deriving his standard for recognising and judging them not within himself but from the area of the things themselves'.

The 'calm glance' that surveys all with equanimity takes in a wealth of initially disordered data, which are for the scientist the basis for future investigation. From these data the investigator must form through systematic experimentation and observation 'experiences of a higher type', which in turn act as the means for discerning the 'open secrets' of nature — her archetypal phenomena. We encounter here a central thesis of Goethe's science. The investigator is not to judge or theorize from out of himself and interpret phenomena in terms of theories he fancies — atomic, mechanistic, or organic. The 'area of the things themselves' must act as tutor and guide. As one rises from initial observations to 'theory', one should remain constantly within the phenomena. Goethe expresses this view again and again throughout his scientific corpus. In a well-known aphorism he says it

forcefully.

The highest thing would be to comprehend that everything factual is already theory. The blue of the heavens reveals to us the fundamental law of chromatics. One should only not seek anything behind the phenomena: they themselves are the theory.

The phenomena themselves are the theory! How can we understand Goethe's injunction? This article is written in large part to answer that question. To penetrate Goethe's scientific methodology and appreciate his accomplishments we must unravel this maxim, feel its contrast with much that passes as scientific explanation, and attempt to practice his science ourselves. Let us make this attempt in meteorology, venturing also into his botanical and color studies where these illumine the former.

Turning our gaze heavenward we may see against the blue sky billowing clouds drifting silently and slowly overhead. The shapes they display call to mind myriad forms, be they castle, elephant, bird, or dragon. For child and bard, clouds are often the birthplace of fantasy.

Sometime we see a cloud that's dragonish;
A vapour sometime like a bear or lion,
A tower'd citadel, a pendent rock,
A forked mountain, or blue promontory
With trees upon't, that nod unto the world,
And mock our eyes with air. Thou hast seen these signs?
They are black vesper's pageants.

(Shakespeare, *Antony and Cleopatra*)

Goethe too loved these shapes and begins his poem 'In Honor of Howard' with just this imagery. The cloud-divinity Camarupa transforms herself from figure to figure so that we stand in awe before her. Thus wonder, the wellspring of knowledge, opens the poem that celebrates Howard's clear vision. In the second strophe the power of fantasy to form the masses into 'camel-necks and vapory dragons' is wonderfully unfolded. These desires of fancy, however, contrast with Howard's 'clearer mind', which has grasped where 'no hand can reach.' As with the botanist, so with the meteorologist, whose 'calm glance' must not order and form nature's work by fiat, but rather discern her laws and patterns through what Goethe called a 'gentle empiricism'. Howard described not elephants but a true typology of clouds. His classification allowed the phenomena to rise in the mind of the observer from a level of nondiscrimination to a higher one in which the ordered movements of the atmosphere might manifest themselves. It allowed Goethe for the first time to study the morphology of clouds.

Few realize that Goethe coined the word morphology — the study of organic form — in letters written to his close friend Schiller, and that he advocated the study of plant morphology already at the end of the

eighteenth century. As the father of morphology he immediately appreciated the potential of Howard's autobiographical sketch; he wrote: 'From all my strivings in science and art it must be clear how precious to me is this process, bestowing form on the formless and a system of ordered change on a boundless world'. It must be emphasized that Goethe did not see Howard's classification as a static projection of what is inherently a dynamic process. Rather, each term reflected a momentary transition point in a great cycle of nature. In one line of Goethe's poem – 'As clouds ascend, are folded, scattered, fall' – the eternal cycle of evaporation and condensation is indicated. In the stanzas that follow we may trace that evolution in greater detail.

Implicit in the poem are two principles that Goethe perceived as animating all of nature: polarity and *Steigerung*. Wherever he turned, nature presented herself in polarities whose opposition brought concord. But along with the rhythmic movements born of polarity he discerned a direction, given through what he termed *Steigerung* – heightening, enhancement, or intensification. These two principles, polarity and heightening, were 'the two great activating forces in all of nature'. Let us consider them in turn.

Polarities – light and dark, expansion and contraction, outbreathing and inbreathing, diastole and systole – commanded a central position in Goethe's science and philosophy. The great Goethe scholar Karl Victor declared that should we have to choose a single principle out of all those that Goethe used to make the occurrences of life intelligible, we could only choose polarity. Polarity was for Goethe 'the eternal formula of life'. We find it in his color theory, his botanical writings, and his poetry.

Consider for a moment the growth of a plant as Goethe describes it in his essay *The Metamorphosis of Plants*. In the development of the plant from seed to fruit one sees the rhythm of expansion and contraction as one passes from node to node. From the tiny seed, the cotyledons unfold and develop into the first leaves of the stem. More leaves are added, becoming larger and more differentiated as the plant grows. They reach their greatest expansion in the fully developed stem leaves. Then, with the approach of the flower, a contraction begins. The stalk assumes a more delicate form, the leaves 'draw inward from the periphery'. The calyx then forms, as Goethe demonstrates, from the leaves themselves. 'Here the stem leaves gradually contract, change, and creep, so to speak, into the calyx'. From the single organ of the leaf nature fashions new forms concentrating in one node what would otherwise be produced successively. 'Thus, in the calyx, Nature forms no new organ but merely combines and modifies organs already known to us, in this way advancing one step nearer her goal'. Following the contraction to the calyx, the expansive development of corolla and inflorescence appears. The flower petals, likewise, Goethe shows to be metamorphosed leaves, the leaf becoming a 'Proteus' able to assume many guises and shapes. Another contraction follows in the forming of staminal organs, and a final expansion

and contraction in fruit and seed, respectively.

From seed to fullest development of stem leaves we noted first an expansion. Thereupon we saw the calyx developing through contraction, the petals through expansion, and the sexual organs again through contraction; and soon we shall become aware of the maximum expansion in the fruit and the maximum concentration in the seed. In these six steps Nature ceaselessly carries on her eternal work . . .

Diastole/systole, expansion/contraction, is an ever recurring pulsation in which the living world participates. It is not a static balance between centrifugal and centripetal forces, but a process in which first one and then the other role gains the upper hand.

Still these rhythmic changes would yield only a monotony of forms if a second principle were not present. Goethe speaks above of a 'goal' in the plant's unfolding, and thereby implies a direction that lifts the plant's growth from simple repetition to a rising, cyclical development. He adds to polarity the principle of *Steigerung* – heightening, progression, or enhancement. The metamorphosis of the single organ, the leaf, is subject to the polar processes of expansion and contraction. But it is also transformed, 'heightened' or raised from stem leaf through calyx to corolla, flowering and forming staminal organs, fruit and seed. It is a full metamorphic cycle from seed to seed, one whose movement is articulated and formed by polarity and *Steigerung*.

Can we discern these elements in the atmospheric cycle of cloud formation and rain as well? Wherein lies the principle of polarity, of expansion and contraction, so central to plant morphology? In a conversation of 1827 with his secretary Eckermann, Goethe presents his views.

I compare the earth and her atmosphere to a great living being perpetually inhaling and exhaling. If she inhales, she draws the atmosphere to her, so that, coming near her surface, it is condensed to clouds and rain. This state I call water-affirmation (Wasser-Bejahung). Should it continue, the earth would be drowned. This the earth does not allow, but exhales again, and sends the watery vapors upwards; whereupon they are dissipated through the whole space of the higher atmosphere . . . This state of the atmosphere I call water-negation (Wasser-Verneinung). If this should continue extraordinarily, the earth . . . would be in danger of drying up.

Thus once again the rhythm of contraction and expansion, this time in the form of inhalation and exhalation, finds its reflection in the phenomena of rain, mist, and cloud. Goethe saw these phenomena as purely telluric in origin – contrary to common belief, unaffected by moon or stars. The earth, not unlike an animate creature, draws the atmosphere closer to her, and then sends it out again. This picture was corroborated for Goethe

through data reported by Daniell in 1823, showing that 'barometers, situated at great distances from each other, often rise and fall together with great regularity'. The planet as 'living earthly body possesses two fundamental movements', wrote Goethe, the daily rotation of the earth about its axis and a periodic change in the earth's force of attraction. Both reflect themselves outwardly in the readings of the barometer.

The daily variations of barometric pressure due to the earth's rotation had been known since the seventeenth century and today are usually ascribed to temperature changes and the associated volume expansion and contraction of air. Large-scale barometric fluctuations can be caused by storms, but vast 'pressure surges', which may extend over both a cyclone and anticyclone, remain very difficult to explain. Certainly however, contemporary meteorology would never advance Goethe's hypothesis of a changing gravitational attraction. Although it would explain the phenomenon, it is not supported by observations in other fields of science. Be that as it may, atmospheric pressure became the centerpiece of Goethe's meteorology.

There are many phenomena associated with weather conditions, but to isolate the essential in any scientific field was Goethe's constant endeavor. The archetypal phenomenon stood for him as the crown of any natural investigation, beyond which one should not go. 'Between phenomena there is a great difference: the archetypal phenomenon, the purest, never contradicts itself in its eternal simplicity . . .' For Goethe the inbreathing and outbreathing of the earth became that eternally simple phenomenon. While it is a phenomenon, the archetype is not directly manifest. Conditions are never perfect for its appearance uncomplicated by extraneous factors. But it can reveal itself to the mind's eye. While local disturbances might spoil its purity. Goethe held to it as archetype. To Eckermann again he said, 'The thing is very simple, and I abide by what is simple and comprehensive, without being disturbed by occasional deviations'.

In his 'Attempt at a Doctrine of Weather' (1825) Goethe compared this polarity to that of light and darkness in his color theory. Light and darkness stand over against one another as poles eternally separate. It is only when they meet in a turbid or cloudy medium that colors spring into view. Consider the brilliant sunset. What essential conditions must be met for the yellows, oranges, and finally reds of a sunset to appear? There are sunsets upon the moon, but they remain monochrome, black and white. On the earth, the atmosphere plays the role of turbid medium, mingling the light of the sun with the dark materiality of air to give the warm colors of the evening sky. By contrast, the dark vault of the heavens arises when we look through the light-filled atmosphere into the dark depths of space. The atmosphere becomes wonderfully versatile in this view, acting in one instance as an obscuring agent, darkening the light to red and yellow, and in the next instance lightening, lifting the black sky into the cool blues above us. Herein lie the 'laws of chromatics', the archetypal phenomena of the

color world through which other color phenomena are understood.

Likewise with regard to weather, the atmosphere acts as that medium into whose 'fine air-materiality' two polar forces work, giving rise to meteorological phenomena. These two are the forces of attraction, which manifest in the appearance of weight, and its opposite, the power of warmth, whose expression is expansion. The inbreathing and outbreathing of the atmosphere, to which Goethe refers, is the manifestation of these polar forces as they work into the air about us. Although the effects are many and varied, they are at the same time lawful, and the rising and falling of the barometer reflect that lawfulness. As in the plant so in the atmosphere, polarity constantly shows itself as a principle active in natural phenomena.

Associated with the rise and fall of atmospheric pressure is a series of differentiated cloud formations. Goethe, in fact, prided himself on his ability to know the reading of barometer and thermometer from visual atmospheric conditions alone. Barometric pressure as measured by the height of the mercury column might be a phenomenon of central importance, but in Goethe's words, to reduce 'the entire complex of meteorology to tables of number and symbols was for my nature impossible'. As we may observe the plant grow from seed to seed through the miraculous metamorphosis of leaf, so also in the rise of mist from the valley, in the formation of low billowing clouds, in the high wisps of horsetails and the dark clouds that yield up rain we may learn to see a similar metamorphic cycle. In his poem 'In Honor of Howard' we follow just this movement from 'the cold mist' stretched like a canopy over vale or sea and rising up the mountain's side, through higher intermediate stages to the 'Father's breast', and thence to thunderclouds 'downward driven by the earth's attraction'. From low misty stratus, through majestic cumulus, to high silvery-robed cirrus, we follow the metamorphosis of clouds caught between the force of earth and the expansive powers of warmth. The cloud becomes the leaf of the sky. It is the single organ that moves through all shapes. While Goethe called the leaf Proteus for its metamorphic powers, he begins his cloud poem by naming the cloud divine Camarupa, meaning 'one who may wear all shapes at will'.

Polarity is active in cloud formation as well as in large-scale changes of pressure. Between the misty veils that hover over valley floor and the high wispy cirri, between these poles, the phenomena of weather unfold. But that intermediate realm also seems to reveal a polarity within itself. For we find there, on one occasion, the beautifully sculpted forms of cumuli, and on another a formless, gray-white cloud-mass that spreads from horizon to horizon. Howard's terminology continues to be used today for this latter polarity: cumulus for 'heap' clouds and stratus for 'layer' clouds. Thus added to the vertical scale from fog to cirrus, is another axis that describes the forms of clouds from stratus to cumulus. Grasses, green and golden,

may spread over hundreds and thousands of acres. So also may layer clouds (stratus) extend over vast areas. Cumuli, however, like single flowering plants, grow and unfold their billowing shapes in our sky. We can follow the life cycle of cumulus clouds from their beginnings on a calm, clear summer morning, and discover their plantlike cycle of development. In early morning looking out over hills or the dark earth of a farmer's fresh-plowed field, we see small cumuli nearly motionless in a blue sky. First slowly but then more and more rapidly these clouds begin to expand, building towers and turrets, which by midday may rise miles into the air. As they reach their greatest height the peaked upper sections glaciate, forming tiny ice crystals, and expand to become threatening, anvil-headed cumulonimbus. Rain showers may develop, but as the anvil head spreads, the shade it provides cools and gradually halts the rise of moist warm air that feeds the growing cumuli. With the cessation of this source the cumuli dissolve, leaving high cirruslike remnants drifting overhead. The sun again shining full on the earth may generate once more small cumuli over hilltops and fields. And so we may watch clouds grow like so many plants, from small beginnings drawn upward by the sun to majestic proportions. Then as the narrow top turrets glaciate, they 'bloom' to become an anvil-headed storm cloud which, like so many seeds, sends its raindrops earthward. Between the earth and heavens, between the formed and unformed, the eternal cycle of cloud formation unfolds. The generation of clouds finds its direction once again through *Steigerung*, rising from vaporous plains of earth to the highest reaches of the sky.

The principle of *Steigerung*, or of heightening and enhancement, which Goethe puts forth, is important for an understanding of his methodology. How is it that the naturalist should proceed in scientific investigations; through what means is one able to win a glimpse into nature's veiled sanctum? Francis Bacon wrote of a method that could be used by all, an empiricism that demanded only the registration of characteristics in Tables of Presence, Absence, and Degrees, from which laws could be induced. It demanded no Aristotle nor Newton but merely a being with five senses and a modicum of education. Goethe, by contrast, presents a method which, while empirically based, demands the constant development of new faculties and sensibilities. Such transformations can take place through outer forces or circumstances, the strokes of destiny and fortune, but also through self-education and self-development. We have the means to shape and cultivate ourselves so that phenomena that might otherwise remain mute speak to us of their forms and laws. The unfolding of new organs is a subject Goethe elaborated on in comments regarding animal evolution.

The eye owes its existence to the light. Out of indifferent animal organs the light produces an organ to correspond to itself; and so the eye is formed by the light for the light so that the inner light may meet the outer.

Out of unformed organs the exalted organ of sight was called forth by the power of light. What was true for sight is true likewise for those faculties of mind which we must develop if we hope to see and name nature truly. Our tutors in this task are the objects themselves. Phenomena, like light, fashion organs suited to themselves. 'Each new object, well-contemplated, opens up a new organ within us'. For as Novalis wrote, 'Association with the forces of nature, with animals, plants, rocks, stones, and waves must of necessity mold man to a resemblance of these objects'. Science is not purely egalitarian in its conduct. Rather, those who by nature and through self-transformation possess eyes to see will see. For Goethe the *Aperçu* is everything. To behold is to know. 'In science, however, is the treatment empty, and all efficacy lies in the *Aperçu*'.

We may understand now why Goethe sought constantly to remain in the phenomenal realm. He worked to behold the archetype through phenomena rather than engage in the rationalism of his period, where hypotheses and models replaced the objects of sense. The phenomena, fully perceived, can rise to the ideal. It is again a process governed by *Steigerung* but now the enhancement is reciprocal. For as nature unfolds organs within man, these in turn lead to new levels of insight, to new higher phenomena, and the circle is complete. Cognition itself becomes a kind of inbreathing of sense impressions and an outbreathing of insight.

The metamorphosis of clouds demanded an attentive and sensitive soul to see and classify their forms. Goethe saw Howard as an individual like himself who, by upbringing and destiny, possessed senses suited for these inquiries. Thus his request to Howard for biographical material whereby he hoped to learn the circumstances of his youth, 'the history of his destiny and formation'.

Although Goethe's meteorological efforts ranged widely, he never considered them definitive or complete. 'The subjects of meteorology are, indeed, something living which we daily see working and producing; they presuppose a synthesis . . . to which man is not equal.' Still, though the character of our knowledge may be partial and fragmentary, its quest remains our noblest endeavor. Our every effort may be met with frustration yet we cannot but persevere. Vision of the true, of the divine demands effort and self-transformation. If the grace of *Aperçu* is to be granted, we must struggle as Faust among the phenomena of nature.

The True, which is identical with the divine, does not allow itself to be recognised by us directly. Rather we discern it only in reflection, in instance, symbol, in particular and kindred appearances. We become aware of it as incomprehensible life and yet cannot renounce the wish to comprehend it.

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SUGGESTED READING

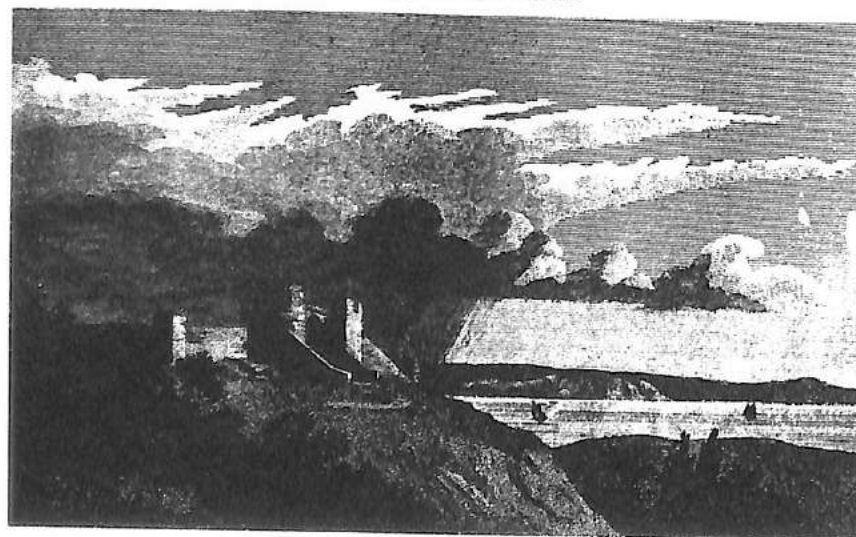
Goethe's Botanical Writings, translated by Bertha Mueller, University of Hawaii Press, 1952. This book also includes an excellent selection of short essays by Goethe on science generally.

Goethe as a Scientist, Rudolf Magnus, translated by Heinz Norden, Henry Schuman, 1949. A general, comprehensive account of his scientific work.

Goethe the Scientist, Rudolf Steiner, translated by Olin D. Wannamaker, Anthroposophic Press, 1950. The commentary to the Kürschner edition of Goethe's natural scientific writings.

Forthcoming: 'Facts as Theory: Aspects of Goethe's Philosophy of Science', Arthur G. Zajonc, *Teacher's College Record*, 1983.

Engraving from *On the Modifications of Clouds* by Luke Howard, 1894



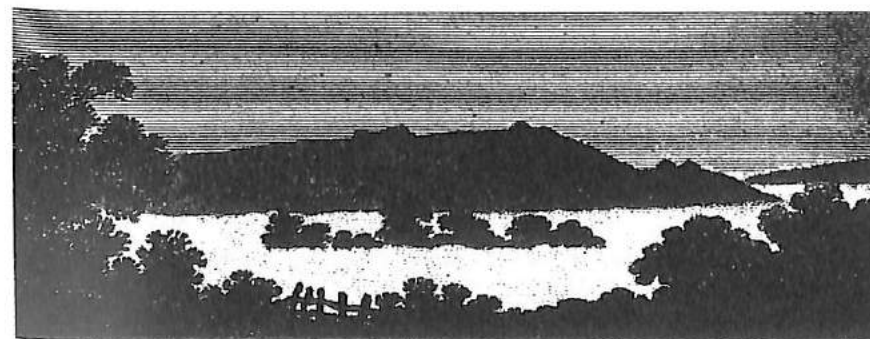
IN HONOR OF HOWARD

Johann Wolfgang von Goethe

When divine Camarupa, wavering on high,
Lightly and slowly travels o'er the sky,
Now closely draws her veil, now spreads it wide,
And joys to see the changing figures glide,
Now firmly stands, now like a vision flies,
We pause in wonder, and distrust our eyes.

Then boldly stirs imagination's power,
And shapes these formless masses of the hour;
Here lions threat, there elephants will range,
And camel necks to vapory dragons change;
An army moves, but not in victory proud,
Its might is broken on a rock of cloud;
E'en the cloud messenger in air expires,
Ere reach'd the distance fancy yet desires.

But Howard gives us with his clearer mind
The gain of lessons new to all mankind;
That which no hand can reach, no hand can clasp,
He first has gain'd, first held with mental grasp;
Defin'd the doubtful, fix'd its limit-line,
And nam'd it fitly. — Be the honor thine!
As clouds ascend, are folded, scatter, fall,
Let the world think of thee who taught it all.



STRATUS

When o'er the silent bosom of the sea
 The cold mist hangs like a stretch'd canopy;
 And the moon, mingling there her shadowy beams,
 A spirit, fashioning other spirits seems;
 We feel, in moments pure and bright as this,
 The joy of innocence, the thrill of bliss.

Then towering up the darkening mountain's side,
 And spreading as it rolls its curtains wide,
 It mantles round the mid-way height, and there
 It sinks in water-drops, or soars in air.

CUMULUS

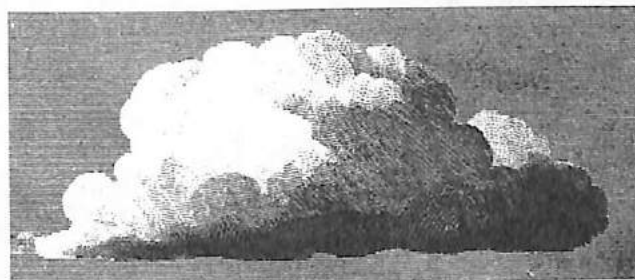
Still soaring, as if some celestial call
 Impell'd it to yon heaven's sublimest hall;
 High as the clouds, in pomp and power arrayed,
 Enshrined in strength, in majesty displayed;
 All the soul's secret thoughts it seems to move,
 Beneath it trembles, while it frowns above.

CIRRUS

And higher, higher yet the vapors roll:
 Redemption is the noblest impulse of the soul!
 Then like a lamb whose silvery robes are shed,
 The fleecy piles dissolved in dew-drops spread;
 Or gently wafted to the realms of rest,
 Find a sweet welcome in *The Father's* breast.

NIMBUS

Now downwards by the world's attraction driven,
 That tends to earth, which to heaven had uprisen
 Threat'ning in the mad thunder-cloud, as when
 Fierce legions clash, and vanish from the plain;
 Sad destiny of the troubled world! but see,
 The mist is now dispersing gloriously:
 And language fails us in its vain endeavor —
 The spirit mounts above, and dwells forever.





Helmut Siber

FROM THE LIFE OF HELMUT SIBER – AWAKENING THROUGH THE ELEMENTS

Doris and John Meeks

It had stormed through the night, strong gusts of wind had uprooted great trees, damaged roofs, and windows; the landscape seemed devastated. All the same, my friend Helmut Siber and I (D.M.) decided to go out and face the elements. At first, more sheltered by houses, it was exhilarating to try our strength against the storm which blew against us with such fury. We half closed our eyes to protect them against the flying particles of dust and grit, and leaned vigorously against the wind. But soon the houses thinned out, leaving the road broad and open, only here and there bordered by groups of trees. Here it was barely possible to make headway against the wind. Not a soul was abroad, trees lay uprooted, only the mighty raging of the elements surrounded us. I began to feel anxious. Now from this direction, now from that, mighty blasts of wind threatened to sweep us away. But we had no time for fear, each moment demanded our complete attention. And so we battled on, sometimes clinging to an iron post to rest, towards a destination which it no longer seemed important to reach, but which gave us direction and inner steadfastness. On the way back the gusts often came sweeping up from behind, so that we rather had to check our momentum, or even walk backwards now and again, until the sheltering row of houses once more afforded us protection.

Helmut later reproached himself for acting so recklessly, and this was surely justified. But looking back, this adventure appears to me in another light.

On many long walks, and on evenings spent together, Helmut took me on excursions through his life. I can hardly even indicate the variety of scenes. The way led from the Far East to America, now into the solitude of high mountains, now onto stormswept seas, through peaceful and highly dramatic weather events. Also in the human sphere it led to deep and significant meetings, but also to conflict-ridden, perilous situations.

I could often observe my friend's face as he related these events. He usually spoke with his pipe clenched between his teeth, the stern, but relaxed lips hardly moving. A strongly arched, aquiline nose awakened the impression of an exceptionally strong character, a remarkable personality. While the lower part of his face had more of a set physiognomical quality, his eyes and forehead were in continual movement, and involved in all that was happening. His gaze fluctuated from an expression of warm interest and involvement to one of sharp, wakeful observation. And the wrinkles on his

forehead provided a lively accompaniment to these sometimes rapid changes.

I realized that the heights and depths through which his life had led him were but a mirror for the drama of his own soul. And when his narration showed me how he was able to meet each life situation with a steady hand and presence of mind, I experienced the power and greatness of his individuality, which I was so fortunate to meet in this way.

Our adventure in the storm – Helmut was 73 at the time – appears to me now as a great utterance of the elements – as though they wanted to confirm his inmost being, by giving him one last occasion to test his strength against them.

* * *

Helmut Siber was born in Bremen on 1st July, 1903. His father was a coppersmith and metal sculptor of great artistic renown. His father's studio exercised a great fascination on the boy. In the front two glass walls and a glass roof let in floods of light, while the rear part with the hammers and other tools seemed plunged in eternal twilight. The father was of choleric disposition, his outbursts often being directed at Helmut, who, despite a delicate and sickly constitution, was determined never to yield to him. Thus his own will forces were tempered, as it were, beside his father's forge, which seemed but an outer picture for the inner fires that confronted each other in father and son. In the outer flames the boy was aware of something beyond a physical process – he saw the darting movement of fire-beings, of salamanders. His clairvoyance finally faded at about the time he made the acquaintance of Anthroposophy in his late teens.

When he was fourteen his father died, and soon afterwards he volunteered for the Army Ambulance Corps. By day he studied in art school, then worked through the nights at the Bremen railway station to receive the wounded soldiers from the fronts. He experienced the most hopeless face of the war. Despite his youth, Helmut had a sharp and critical eye for the social problems of the times, and felt a deep compassion for the human misery caused by the war. He soon became convinced that the war was being needlessly and intentionally prolonged for fear of a social upheaval. He decided there was no alternative but to encourage and work for this upheaval. As a political activist he set up red cells in the German army. At the same time he sought to give artistic expression to the plight of the oppressed. Four large lithographs dated 1918 to 1920 testify of his inner struggle to understand the forces of social injustice.

In the first a sullen, Mammon-like figure in shining gold broods atop a great rock. A slight greenish tinge to the gold seems to express the fallen side of the metal. Behind him is the grey outline of a church; before and below him are the emblems of political, industrial and military power. The rock of oppression, in shape like a giant hour-glass, bears down upon a Promethean humanity, heroically struggling to brace up under its weight. A mood of

hopelessness and despair hangs over the whole.

In the midst of the social chaos which followed the war came a great turning-point in Helmut's life. Looking back, he wrote: 'Then came the Revolution (1918) and street fighting (1919), the great chaos, the attempt to build up a new social order and the breakdown of all these efforts. In February 1919, when Bremen was encircled by the Berlin government troops, tanks and artillery, a friend handed me a leaflet in which Rudolf Steiner first attempted to introduce new social ideas. I was carrying a dying Red Army man on a stretcher when the leaflet came into my hands . . . I worked for the spreading of these ideas until 1921 or 22, when it became clear that the German people rejected them'.

The meeting with Anthroposophy brought new light and new hope into his life. It also brought a transforming power which could shine into his artistic work. A further lithograph, dated 1920, appears like a metamorphosis of his first despondent attempt. The proportions of the rock have changed, so that the upper part no longer weighs down so heavily. The mammon figure has disappeared, and the upward-striving of the multitudes has formed itself into a chalice which opens towards the heavens. The series, entitled 'Aufwärts' ('Upwards'), culminates in two representations of the architecture of the First Goetheanum. It was published in a limited edition by the Bremen branch of the Anthroposophical Society.

On the occasion of a visit by Rudolf Steiner in Berlin (presumably September 1919) Helmut, then aged 16, boarded a train and at once went to seek him out. In a torrent of enthusiasm which ran on unabated for half an hour, he poured out his ideas and plans, culminating in the suggestion that Steiner should lecture to the dock workers in Bremen. Steiner agreed, on the condition that he could be guaranteed an audience of 2000. All the preparations went smoothly, until the union intervened, and threatened to dismiss any member who attended. Few were prepared to risk losing their jobs, and so the lecture had to be cancelled.

Helmut continued his art studies sporadically by day, while working as an apprentice in a lithography studio by night. After three years he passed his examination in lithography at the age of 19. The following year he spent in Worpswede, where he did lithographs and copper engravings for prominent artists. One evening – it was Sylvester 1922 – he brought his painting equipment to a friend, and asked permission to use his studio. Seized by a great creative urge, he painted the whole night through. The subject seemed a riddle even to himself. His picture showed multitudes of people reclining on a hillside, their arms and hands stretched upwards. Over them, a white cross, and in the background a sky in flames. On the next morning his friend returned, bearing the news that the Goetheanum had been destroyed by fire.

There followed a decade of intensive travel and observation. Disappointed at the failure of social reforms in Germany, he longed to get away and see the world. He found work as a longshoreman in Bremen, in the

hope of being recruited for a ship bound for the Far East. After waiting in vain for some months, he enrolled in a course in Morse telegraphy, and was eventually hired as a wireless operator. His strong character and natural abilities, however, soon earned him positions of higher responsibility on board. His first three journeys took him to India and Burma, and subsequent ones to China. His paintings of animals on transport for a circus, and his early attempts to paint storm clouds had something of the dynamic spontaneity of the old Chinese masters. The expressionistic, visionary quality of his early lithographs was left behind, and a quite new power began to reveal itself. The keen observer, utterly devoted to his object, was able to capture its essence in a few simple strokes of the brush. There can be little doubt that the strength and individuality of his style, which he began to explore at this time, was a product of the powerful will-forces which he was able to surrender in a totally selfless way to the artistic process. These forces were always fully at his disposal, whether he was engaged in artistic work, or standing at the helm of a ship, steering it through a violent storm, and rejoicing in the battle with the elements. Characteristically, he did not like to work indoors or sitting down. 'When you model, as it were, the cloud-forms with the brush – every type requiring a different movement – not only the fingers, but the hand and arm take part, and this movement must be free to extend through the whole body. You can no more handle your brush freely in a sitting position than you could a rapier. As painting during a storm is a battle with the elements, this comparison seems close'.

His iron will also served him in the sphere of human relations, and carried him unscathed through many perilous situations. It is possible that his uncompromising and unyielding moral uprightness was the very quality which brought him into many situations of conflict – especially during his seafaring years. His diaries tell of many a brawl among the sailors in which he fearlessly intervened. It is a most remarkable thing – one has the impression reading these diaries that fear was a thing virtually unknown to him. And subsequent conversations with him in the last decade of his life seemed to confirm this impression.

Siber describes the power-struggles among the crew members which frequently broke out into fighting. In port the influence of alcohol and sometimes cannabis led to dangerous and explosive situations. Speaking of his relations with the sailors and menial workers, he writes: 'If one wants to control the life of such a group of men, one must also accept certain responsibilities. One must protect them when they need protection. Most of all, behind the strictest handling there must be a feeling of brotherhood, unseen, unspoken, but real, even towards the most destitute characters. They all belong to humanity, and that they have sunk so low is not their fault alone. There are dark forces at work quite unknown to them. If I permit these forces to take hold of me ever so slightly, my failure is greater than that of these men, even if they let themselves be entirely driven by

them. I have a right to thunder at a man if he misbehaves, but I must never hate him. I must be thankful to him that through his failures he assists me to see my own clearly'.

In addition to protecting them from each other came the need to assert his own rights. 'You cannot have a gang of roughnecks playing cards next to you, chewing and spitting all over the place, when you want to work. Thus I made the noisy fellows play in the mess room, gathering the men who wanted to read or study around me in my quarter. It was surprising to see how many there are who want to study one thing or another, once the opportunity was created. Then I started giving lessons, German to one, English to another, and I began yesterday with French lessons. My assistance is free to anyone who cares for it. One man studies navigation, another astronomy. We went ashore and bought books together. But I do demand and enforce quiet during the hours when my little group meets. Of course, we have many discussions about various subjects – war, revolution, social reform, but here too I demand gentlemanly behaviour when the arguments grow hot and show their tendency to take their normal course, ending in fist fights'.

During his travels to the Far East, Siber met the orientalist Veltheim-Ostrau, who was to exert a great influence on his life. He recognised Siber's gifts as an observer of social conditions, and his compassion and sense of brotherhood. Through his encouragement Siber resolved to spend several years of his life systematically studying the social plight of the working class by joining ranks with them and working in a great variety of menial jobs. Veltheim hoped he would put to the test the contents of a book by Hirsch on the economic miracle in America, and the effects of factory labour on the workers. He saw the possibility that by adequately documenting the human misery and exploitation in the industrial age, similar developments in post-war Germany might be hindered.

The next years of Siber's life were spent for the most part as an itinerant labourer in the United States, with several stints of seafaring in between. His aim was to stay at a particular job only long enough to master the skills, and to make sufficient observations for his reports to Veltheim. Apart from the task he had taken on, a life of this kind had a certain appeal to him. It was his ideal to be self-reliant and self-sufficient, never to become a burden to anyone. The ability to acquire manual skills, to improvise creatively in every conceivable situation, was to him a means to this end, and at the same time a path to a universal education. He later compiled a list of the jobs he had done from around the age of 23 to 28. The following is just an extract: tree-feller, builder's joiner, bricklayer, worker in a silver refinery, interior decorator, tie-layer in a railway yard, road worker, labourer in a tunnel-blasting gang, lumber yard worker, sheet-metal roofer, gardener, housepainter, shipyard worker. For a time he set up an interior architecture partnership, and later he designed and built private houses. His description

of the conditions in the silver refinery surely belongs to the most powerful and eloquent statements on social injustice in this century, and is a remarkable testimony to Siber's courage and dedication in fulfilling the mission he had undertaken. Together with his other observations he sent it to Veltheim-Ostrau, who in turn presented it as a warning to various German firms. By this time, however, the era of National Socialism had begun, and the warning was not heeded.

In a letter to a friend in America, Siber tells of the period which followed, and of his meeting with Helen, a journalist, art historian and eurythmist ten years older than himself, who became his wife and a faithful life-companion for the next 38 years. '*In 1932 I met Helen. It was only through her interest in the weather studies I had done as a sideline that I gradually gave more time to this, and began to feel that it should become my life work. Our happiest hours were spent when I returned from painting trips and we viewed the work together. She saw far more in the paintings than I did. I could never be satisfied with my work because I had seen the *real* nature, and my pictures seemed a feeble effort to report that experience. I don't know whether Helen simply over-estimated my early work, or whether she could see the possibilities of further development . . . Helen did not praise the paintings, but you could see they stirred her, they spoke to her. They made her happy as nothing else did, and that alone was for me a call to do more and better.*'

I spent the following war years as an 'enemy alien' in the Pocono Hills, where nothing in my life changed but the sky. There I did the first serious weather studies, 18 years after my first attempt to paint the low clouds of a thunderstorm in Elephanta Island in India.

Now looking back, it becomes clear that most every step I took in life led to this particular work. First going to an art school, seeing the work of others who used the sky as a background for landscapes; then specializing in drawing freshly-caught wild beasts of the jungle, and thus learning to work fast and *observe while drawing*, so that the hand nearly works by itself; then standing at the helm on ships during all weather and learning to know its real character'. (5.3.1973)

In order to study and paint the weather under the most ideal conditions, Siber sought out opportunities to stay for longer periods of time on mountaintops, where the ridges act as meteorological divides, and it is possible to observe the birth, development and death of thunderstorms and other dramatic weather phenomena. In 1952 he spent several months in a fire tower in northern California, where he was charged with the task of spotting and reporting forest fires. Most of these were caused by lightning. In the next years he found similar sites in the Appalachians. The experience of a thunderstorm from within awakened a deepened apprehension of the spiritual forces at work in such a natural event. In a letter (1976) he writes:

'Just as one can experience cosmic music pulsing through one's being

during a sunrise — and even more so *before* sunrise, — or in the *afterglow* of the twilight after sunset, — so one can become aware of how beings move through one which are connected to the mists, to springs, to the plants. They stream through the soul. And in great thunderstorms? Just as the beings of springs, of flowers weave through one's inner being in a delicate, ethereal way, the wild powers of a thunderstorm take hold of one with elemental might, so that one must summon up all one's will, all one's self-consciousness, to resist their onslaught, to maintain one's existence. But at the same time, one is able to draw energy from these forces to portray them pictorially, so that they may be recognized.

'It would not be possible to gain such a relationship to the demonic forces of a thunderstorm if the creative powers did not predominate in almost every case, holding sway over the wild elements in the darker, lower reaches of the storm clouds. Up above, where the summits of the clouds consist of ice-crystals, lofty, sublime beings are at work, who for a time intervene from the widths of the cosmos and control the course of the storm.

'The destructive, demonic forces stream into the storm from the interior of the earth — for the earth also harbours *such* forces — from above descend the creative, cosmic forces, which work against the lower, telluric powers. It is always a mighty wrestling, a battle for equilibrium'.

Although Siber never attempted to portray the beings at work in the weather directly, his painting does indeed awaken a feeling for their activity. They invite the viewer to participate in a process, to enter into a dynamic play of forces. What meets the eye is in a continual state of becoming, which suggests a past and a future. The question has sometimes been raised: are these paintings to be seen as works of art, or as scientific illustrations? It was Siber's concern that they should meet the most rigorous standards of science, and yet be able to stand as works of art. As science they can enhance our understanding of natural processes; as art they bring to visibility the activity of beings who are the link between the inner life of the soul and the natural world. Perhaps it belongs to the very character of these works that they cannot easily be classified in a traditional way, that they represent a new and unique bridge between the two realms.

Referring to this quality of Siber's works, several artists and scientists working in the anthroposophical movement spoke to him of the kinship of his cloud painting to Goethe's scientific method. He was encouraged to hear this, and took statements of this kind as a confirmation of the rôle such weather studies had to play in the evolution of human consciousness. Yet he denied being directly inspired to this work either by Goethe or by Steiner. He felt that this impulse had entered our times from quite another direction. 'In earlier times', he wrote, 'there have been numerous cultures which disappeared underground like a river, and then re-entered human history much later in another form. Imagine what a thorough knowledge of the weather was attained by the ancient Indian culture, or by the cultures which

produced such monuments as Stonehenge. In one form or another these streams re-emerge, quite particularly in our times, in which new impulses from all spiritual directions enter into the stream of human development.

'I made three journeys to India. Each time I experienced a strong connection to this part of the earth. It was not what one sees today in India; what attracted me had long since disappeared, but in the earth and in the atmosphere it still lived. Today it no longer attracts me. I now feel a longing for the region of Stonehenge. There I would like to spend my last days.'
(1976)

This longing, which could not be fulfilled, was characteristic of the last period of Siber's life. After Helen's death in 1970, he returned to Europe; what was intended to be a brief stay for medical treatment became a long and painful exile. Disappointed to find the face of his homeland scarred by industry, he wandered from place to place in search of a peaceful haven for his work. He was particularly sensitive to the harm which had come to nature through human exploitation, and he longed to find himself once more in a region of unspoiled beauty. Yet he never regained sufficient health to travel independently, nor did his flagging financial resources make possible a return to America. He continued to paint by fits and starts, but without the old resolve and energy.

He was filled with a deep concern about the future of his impulse, for which he could find no successor. Accustomed to living in mountain solitude, surrounded only by nature and the changing elements, he had about him the air of a recluse, even in a bustling city.

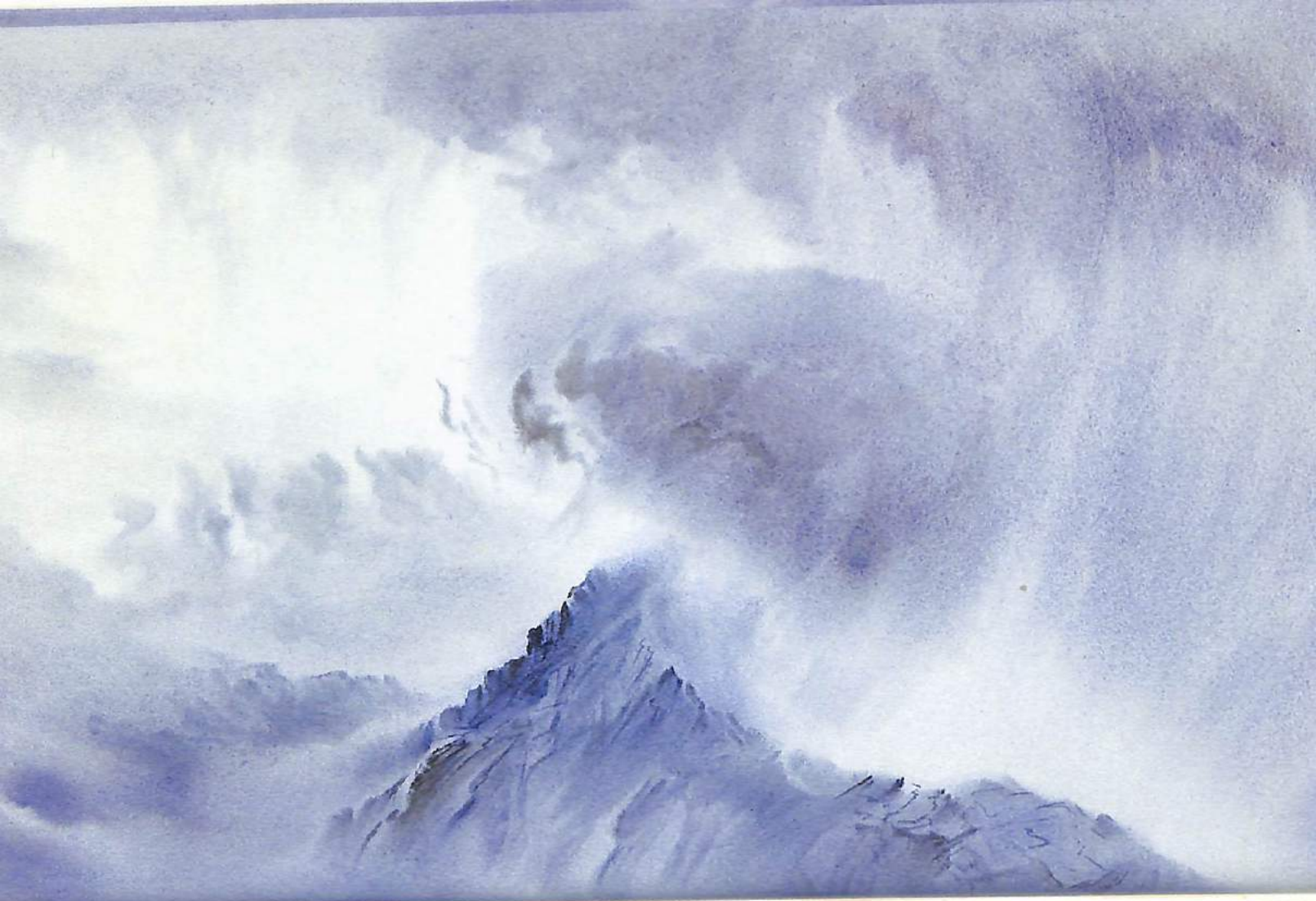
When I once visited him in northern Germany, he had hardly spoken to a soul for several months. But he quickly blossomed forth when he found he could speak to someone who listened with reverence and earnestness. His rich and eventful life seemed to stand before him like a vast panorama from which he could draw in telling of his travels and adventures. Yet he was not moved to this out of a pre-occupation with the past; he had begun to see the healing value of his life as an example of what is possible, as an alternative to the stifling compulsions of a bureaucratic and technological civilization. Another healing power for humanity he continued to see in Anthroposophy, which had accompanied him for more than half a century. Returned to Europe, he found many possibilities of exchange about Rudolf Steiner's ideas. Yet here, too, Siber maintained his characteristic individualism, a kind of Emersonian self-reliance which shrank back from becoming anyone's disciple.

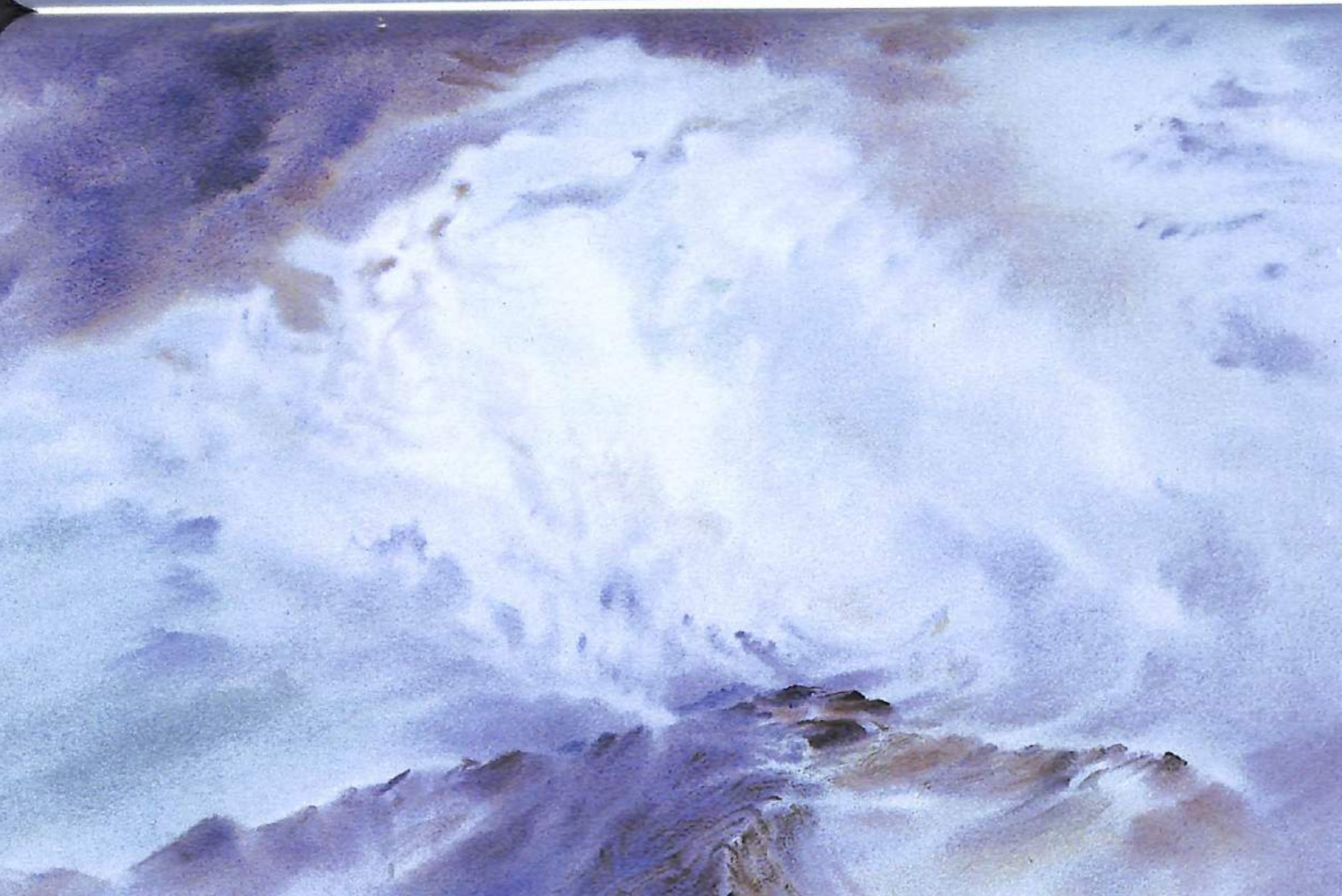
And so, despite a growing sense of loneliness, deep meetings and friendships came about. When at last the sense of isolation and of not being understood grew to the proportions of illness, close friends stood by him in the last difficult time up to his death in 1984.

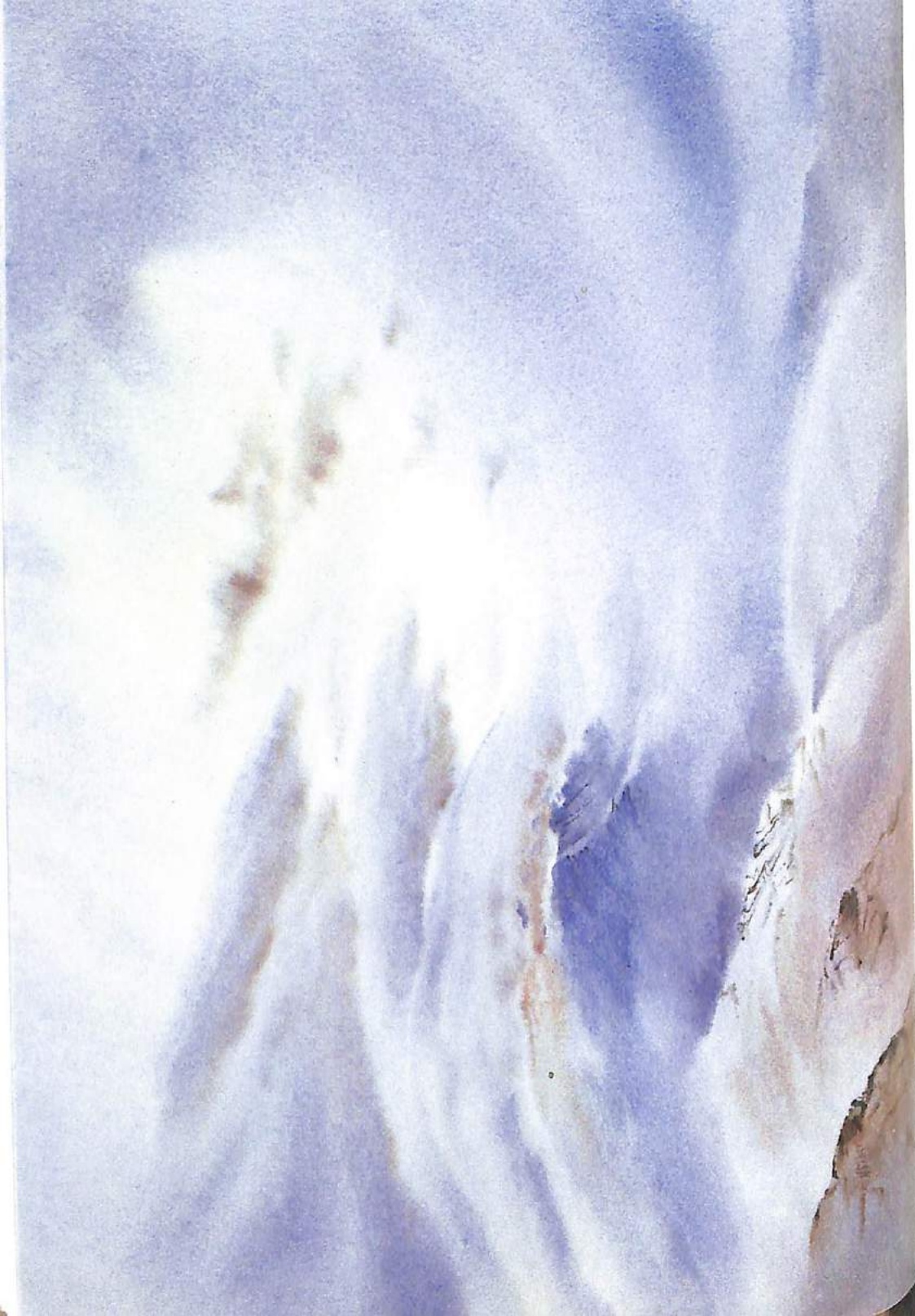
Despite the tragic character of this last period, I am convinced that it was of deep importance to him. In countless symptoms he saw the signs of











inevitable decline in Europe. He faced this recognition and the sorrow it brought with the uncompromising dedication which the development of the consciousness soul requires of modern humanity. In his presence one could feel how he continued to live with great impulses and intentions which could no longer find an outlet. The fires of a will thrown back upon itself seemed to consume the delicate body. These impulses point powerfully to the future, and their unfolding may bestow great blessings on humanity when their time has ripened.

PAINTING THE WEATHER

Helmut Siber

My paintings of weather are the result of over forty years of cloud study. They were undertaken partly out of necessity in connection with other work and partly out of an intense interest in the subject itself. These studies began on trips to the Far East from Bremen, where I grew up, to India, China, Burma, Sumatra and Japan, as well as to North and South America.

Some of the occasions where it was necessary for me to observe the weather arose during work at sea, as sailor, wireless operator and later helmsman on the bridge of German and American freighters. On land I made trips to the mountains for the sole purpose of studying clouds. Mountain barriers create their own weather: this I learned from mountain climbing in Europe.

In the United States I found an excellent site for my studies in the Appalachian Mountains. This chain stretches over a thousand miles, from Canada, where their slopes touch the sea, across the eastern United States in a series of ridges, ending in Georgia, where a broad coastal plain separates them from the Atlantic. Several peaks exceed 2000 feet. I have also painted in the West, in the Sierra Nevada, where the highest elevation is over 14,000 feet, and in the Pacific coastal ranges of California. These ridges form a barrier to Pacific air currents which they must first overcome before continuing to the Sierra and other ranges, as well as the great plains, undergoing many transformations on their 3000-mile journey to the Appalachians.

In my early years I specialized in drawing animals on trips to India and Sumatra, and so learned the quick rendering of impressions. For such studies one has to observe intently, and at the same time to draw. The hand must know what it does without conscious attention. What applies to the drawing or sketching of animals applies no less to painting the ever-so-fast moving clouds. There must be a close co-ordination of hand and eye.

One must learn to show the form of a cloud with a single stroke of the brush. There cannot be any preliminary drawing or outline, or a composition planned ahead — this must evolve gradually. Every move of an animal is governed by its anatomy, the skeleton and muscles. These are the laws which underlie its movement. In like manner are laws to be discerned in the formation, movement and disintegration of clouds, which have characteristics modified by air and wind. The result is seen in varied forms of cumulus, or of cirrus; also in transitional states from one type to another. It is necessary to acquire knowledge of what may be called the anatomy of weather from books on meteorology.

To get an *intimate* feeling and understanding of the weather, however, we must be *in* it. When one has to be in it, one becomes one with it, for it surges through body and mind. Wind force, precipitation, lightning or heavy seas require counteraction by man, and in this way more than any other, one gradually acquires an understanding of the forces in the weather which goes beyond what can be learned through the study of books or the reading of recording instruments.

So many elements are involved in a large storm, numerous types of conflicting and battling air currents, that without a basic knowledge of meteorology the impressions became chaotic. But there are laws in the apparent chaos which must be discerned when attempting to portray a storm. Thunderstorms have life cycles. They are born when conditions in the atmosphere demand a removal of impure air near the surface of the earth and its replacement by pure, rarefied air from the higher stratas. They have a growing period, a climax of power, or maturity, and periods of decline and disintegration. Each stage has its characteristic sequence of cloud development and transitional intervals. Stationary storms will show this sequence from birth to disintegration more clearly than storms associated with fronts. These often begin to show evidence of decline only to resume growth and reach still greater power as the front surges across the land, encountering new areas of impure air. Thus a storm may reach repeated states of maturity.

Just as we can speak of the aging of a storm, we can rightly speak of the aging of a cloud. But where are the borderlines between the growing state, maturity and aging? When one is on a high elevation and fairly close to a cumulus congestus which is developing into a cumulonimbus, a subtle change of form can be observed in the surfaces of the high columns at a certain phase. A cumulonimbus is actually an assembly of clouds of many types. The clouds at the base of the great build-up are very dark, consisting of water droplets with a high content of dust and other impurities. The middle clouds appear grey or often of sulphur colour, consisting of water droplets or snow crystals or both. The very high domes, rising more or less out of the centre of the storm, appear brilliant white, or glowing orange or rose towards sunset, an intensive glow in daytime and even very bright in the

light of the full moon. These great columns of cloud consist of minute ice crystals and their brilliance is due to refraction.

At the base of the great build-up are nimbostratus, fractonimbus, fractostratus, all in great turmoil, in threatening dark grey or near black, sometimes brownish or reddish shades. Towards the mid-height of the cloud gathering are cumulus and altocumulus in milky greyish colour, and above these, in even greater brilliancy and blinding whiteness, the high domes.

These great columns have rounded tops and protuberances, giving the impression of dense boiling steam. More and more seething, rounded columns rise ever higher out of the cauldron, reaching 30,000 to 40,000 and in extremely powerful storms up to 50,000 feet above sea level. At the same time their icy-whiteness increases.

Up to this point the cloud is growing. Lighting flashes within the cloud from column to column or into surrounding space, and from the middle height and the dark base lightning may strike down to the earth.

And now, for a brief period, the surfaces of the high columns suddenly lose their softness and steamlike appearance and seem to contract into pillars of ice which hover in space. Evidently, the powerful updrafts and downdrafts of the storm align the ice crystals in such a way that an impression of immense, if ever so delicate, ice pillars is created. This may be a very brief phase, and after this interval, which I consider the highest point of the cloud's development, — its maturity —, the forms come back to their previous appearance of soft, steamy columns. Gradually they lose more and more of their whiteness and the whole cloud starts to age. It sinks down into itself and spreads out at a lower level into stratocumulus or even disintegrates entirely.

If this brief period of maturity can be discerned, we can feel assured that the thunderstorm has reached its climax and will lose its power. It could rebuild if it moved over new territory, but this should be considered a new storm.

The first time I was able to determine the turning point from the state of growing to that of disintegration, the few minutes when the storm had reached its culmination, was at the elevation of a fire tower, 5400 feet, which was generally level with the base of the storms. These storms were in most cases surrounded by clear, dry air so that the visibility permitted good observation.

When there are numerous storms, more or less stationary, within close proximity of each other, it can occur that the most powerful will draw to it some of the others, resulting in extremely violent activity.

Having observed this period of transition from growth to disintegration in many instances from the tower, I have been able to see this development later from much lower elevations. I would not have been able to discern the transition without having been relatively close to the storms previously. It proved of value in my further work in the Appalachian range which

followed the studies in California.

* * *

I have seen many paintings of the sky by great masters, but through my various outdoor occupations I became increasingly aware how different the actual weather is from the usual portrayal of it. The reason seems to be that most painting was done inside studios, usually after the event, and in oil colours. And even when the medium of watercolour – so much more suitable for sky painting – was used, the techniques of oil painting were still largely applied. Further, the earlier artists had not benefitted from our rather recent scientific comprehension of the various weather factors ruling in the atmosphere – the anatomy of storms. It was only in 1803 that the Englishman Luke Howard worked out the classifications of clouds which became the guide for meteorological studies in the west.

There were many days or nights during storms at sea when I had to steer an old freighter or tramp, often at the edge of seaworthiness or beyond, against high winds or seas, and often the thought would rush through my mind, 'This is *real* weather, this is what artists should paint'.

Then one day in 1923, as I emerged from the Cave on Elephanta Island near Bombay, where I had spent some hours in the dim light drawing the sculpture of Trimurti hewn out of the cave's rock, I found myself caught in a thunderstorm, preventing my return to the mainland in a small boat. There was no sailing back until the seas subsided, nothing to do but wait out the squall, and here I was, with all my painting equipment at my side, and before me the wildly gyrating fractostratus and fractonimbus clouds. I stood back under a projecting rockshelf and started my first painting of a storm. Within less than a minute a freak gust snatched my paper and carried it out over the water. I found another, more sheltered position and seemed to get ahead with my second try when again the wind found me and now blew rain onto my work. Thus it went on for nearly two hours. I must have made seven or more attempts and ended with but one study that could be considered an indication of storm clouds, at least while the colours were still wet. After they had dried, all one could see were swaying tropical trees, my clouds had vanished into the damp paper.

This first attempt was not followed soon by another. It had been too discouraging, and yet, the defeat meant a challenge. Ever again my thought would return to this depressing failure. Through every storm thereafter, whether at sea or on land, I observed the clouds not only for what they meant for the work I was engaged in at the time but also considering what equipment would have to be constructed to be able to paint out in a storm, and what technique would have to be developed to portray the atmospheric effects. It was evident that the technique would have to permit great speed without giving the impression of hasty, careless work.

It was on a trip to China when I made my next serious attempt to solve the problems arising in painting the weather. The occasion was a visit to the

university at Amoy where I experienced the true, warm and generous hospitality for which the Chinese are known, after having had serious encounters with roving bandit-soldiers in the interior four hundred and fifty miles up the Yangtze Kiang. Coming out of a civil war-torn region, where I frequently was suspected of being a spy, even when painting a temple Amoy seemed a fragment of heaven.

Nature in this part of Fukien Province speaks a powerful language. The impressions are almost overwhelming. The configuration of the mountains reflects great natural upheavals of earlier periods. The ridges are abrupt and sharply cut with enormous boulders resting precariously on the very summits. There are deep ravines with lively springs and waterfalls. The flowers are of unusually intense colours, perhaps due to the fog which comes in from the sea. There are many kinds of butterflies and in the night the air is filled with myriads of fireflies. The traveller is met along the paths and rock walls by mysterious stone figures which gaze serenely into space. The impressions of the whole environment play a strong role when painting any aspect of nature. The day when I painted the fog that came in from the sea I made these notes in my journal: 'I await the coming of the night on the ridge of a mountain. The light is fading slowly. In the far distance mountain ranges are alternately revealed and veiled by low clouds. The life in the valley gradually subsides. From far below the strange sounds of a flute faintly reach the heights. It becomes even quieter. Occasional shrieks of large hawks returning to their nests are the last sounds of the day. A heavy fog wall moves in from the sea, embraces the lower slopes of the mountains, lowers down into the further reaches of the valley and crawls, serpent-like, up the opposite slopes. The full, deep tone of a huge temple gong rolls through the valley. Its echoes are swallowed by the fog which glows like fiery red, boiling steam as it is penetrated once more by the last rays of the sun. Then darkness rises out of the ravines and spreads far and wide. Incense from a little shrine in the woods fills the damp, warm night air'.

Even today when I look at this painting of the fog and mist, the impressions arise again of this beautiful region of the earth where nature is so powerful that it changes the physiognomy of those who have lived in China for many years. It seems that paintings have a strong power to call back memories of experiences one has had in nature.

Painting in the vicinity of Amoy also led me closer to an understanding and appreciation of the old Chinese masters. There are two ways of painting a landscape in fog. The Chinese solved the problem by having the mountains, or trees, or the hut of a hermit, fade away into space untouched by the brush. It was done with such skill that the viewer sees fog or mist in parts of a painting where actually there is nothing but silk or paper. I never view a work such as this without the deepest enjoyment and admiration. Yet I could not adopt this form of presentation. In every mist or fog is something active, moving, and alive, which one can perceive. It is anything

but blank or vacant space. It is fairly alive; forms, if ever so faintly, can be seen which may move almost imperceptibly or even rapidly, although the total mass of the fog may appear completely still. Movement can be seen even down to the smallest particles of fog. This I discovered when I had an empty, tall watercan, used for soaking paper, beside me. I had finished my work and emptied the can. The fog had become very dense. The inside of the can appeared nearly black. There, in the upper part of the can, against the dark, could be seen the minute particles of this fog rapidly revolving although no air current could be felt, or was evidenced in any other way. Because of the depth of the container where light could not penetrate, the illuminated water droplets near the top became visible and revealed their activity while all the fog around me appeared as an apparently motionless mass of grey wetness.

What holds true of the inside of fog holds true of the interior of clouds. There is never rest; there is continuous movement, great activity, even in the calmest of clouds. Not only is there continuous movement, there is also a continuous growing and disintegrating within every cloud. It does both constantly, at times it grows more than it disintegrates; at other times the reverse is true.

For these and other reasons I cannot paint a landscape in fog by having the objects fade away into emptiness, but I endeavour to do what may seem impossible, to paint the fog itself first, and bring into this whatever part of the earth's surface should be seen. This is the other way.

So on and off, for many years, I came back – I was drawn back – to painting fog and clouds in spite of their being such difficult subjects, or perhaps because of this.

There were many other occupations which interested me, like designing houses and especially actually constructing them, where I could test some ideas I had in this field. There were occupations in which I was interested in learning what other men had already worked out, and what had become rules and methods in a given trade. To study working and social conditions, I worked in numerous factories, before the blast furnace of a metal refinery, in a shipyard, as a longshoreman loading and unloading ships, in a large tree nursery, and one time underground when a subway tunnel was blasted through the rocks of Manhattan Island in New York.

But ever again I had periods when I resumed my struggle to record in painting what I constantly observed and which has such a dominating influence on the life of man and events – the occurrences in the atmosphere. In this field a great deal could be done which had not been done by others. I never considered myself an artist, or a scientist, but simply an observer of nature and I felt a compulsion to show in the form of painting what I had observed of weather. It required that I develop a special technique for these studies but also set some standards for this work. These paintings, especially those of storms, should reach a level at which they could be accepted as

scientific observations and also as works of art, if possible.

Watercolours of clouds and weather in the mountains are best made from higher elevations. When paintings in this medium are to be completed at the time of a storm and on the spot, it is necessary to work where activities around the peaks can be seen to best advantage and yet at temperatures permitting work in the open, or in some temporary shelter, which I often constructed of sturdy canvas attached to any available support. Winter conditions require working with enough protection to prevent a film of ice forming on the surface of the damp paper, as it has often done for me where temperatures lowered unexpectedly.

In paintings of weather I am attempting to maintain a balance between scientific observation and artistic creativity. A question is often raised after lectures, 'If scientific accuracy is intended, would not photography do better?' The camera, even if focused carefully, does not select as the human eye does. It can only take in everything that is there; it cannot select the essential from the mass of detail it records. The human eye at once selects, and, if trained, will draw out the essential from the abundance of detail. In painting, selection is one of the most important aspects. The great Chinese and Japanese artists were masters of selection.

The impressions of the eye flow one into another as do the changes in the sky, but the camera snatches a second or, in the moving picture, countless such exposures, which follow in rapid succession, as also do the slight intervals between the shots. When a film is shown, all these shots and breaks race by and are actually an unreality – a misrepresentation of the continuous change that has gone on in nature. In a photograph we see a dead image of life; in a painting one may feel the pulse of life and it can speak to the innermost being of man.

I have taken hundreds of photographs of clouds when there was no opportunity to paint. They have value in studying details and as a record of what went on, much in the same way as notes made of air pressure, temperature, precipitation, of which I made records also. But look at these photographs as I may, they never arouse a memory of the experience. This is partly because while taking photographs one is absorbed in the manipulation of the camera and thereby loses the opportunity to make the event an inner experience which should live on. In the same way we deprive ourselves of an inner enrichment if we notice a fine sunset and do not stop our activities in order to observe it, or pay homage, as the Japanese do when they bow to the sunrise. While painting a sunrise one absorbs this event with all the senses. By the very act of painting the eye becomes more observant and, while one is concentrating on seeing, all the other senses become more sensitive. The impressions of the sound of the wind, the scent of the air, its salt content, its pressure, all are 'recorded' inwardly, and in some way enter the painting, even though one may not be conscious of this at the time. The recording by camera may well be more accurate in detail but it cannot be as

all-encompassing as the recording by the most perfect instrument – man.

Another question frequently asked is, 'Would not the scientific approach hinder the free creativity of the artist?'

By observing the laws involved in a storm, the artist will actually see more than he would otherwise. What would seem to be total chaos now becomes a comprehensible, organic development. Since only fractions of a storm can be shown in any painting, there is ample opportunity for free creativity. Even though a painting should not, for the sky alone, require more than ten to twenty minutes, in this period many changes have taken place in a storm, many clouds have passed or grown, or disintegrated, so that one can work with continuous change, selecting here and there the elements most characteristic of the particular state. In this selecting the artist will find all the freedom he needs.

Painting the weather at all seasons of the year led me to closer observation of all events in nature.

In the plant world spring follows the reluctant retreat of winter weather. As the new life of spring moves northward it also ascends the higher elevations step by step, a little at a time, but never retreating, clinging to each advance it has made and only temporarily stopping when the weather turns cold again, resuming its upward drive with the next warm days. It may rise from the valley floor several hundred feet a week, it may rise faster or slower or come to a standstill for a while, but the upsurge of life never retreats. There is a constant move upward as there is a constant advance northward.

This is contrary to the weather seasons which come in like the tides of the ocean. There is a gradual advance, then withdrawal, then coming in a little farther each time and only gradually reaching the culminating point, comparable to the high tide mark, in the full warmth of summer.

The first indication of spring is evident to one walking on snow-shoes over snow-covered fields in March. There is a feeling of life beneath the snow, straining to break through the bondage. Even though there may be several feet of snowcover there is a new scent coming from the earth. The twigs of last year's growth take on colour as the sap presses into the branches of deciduous trees which now have a new delicate colour, purplish, yellow or whitish green, barely visible. This is the first confirmation that life has survived the dead of winter. Then a cold wave from the north reaches southward and the movement in the plant world is arrested. With the next advance of warm air, with mist and fog rising from mountain sides, another forward step is taken in the growth of buds on trees. Then again a cold wave, and again the progress is halted. All the signs of winter have returned, snow, sometimes mixed with sleet, and viciously cold winds. The buds, ready to open, are covered with ice. But this may be the rearguard action of retreating winter. At last the great change occurs. A day-long, warm rain enables the leaves to burst forth and the first delicate green now veils the woodlands. Soon we hear warblers and at last the buzzing of bees. Spring

rushes onward to the high tide mark of summer.

At summer's close the first frosts are followed by warm days in which flowers bloom. Even killing frosts still give way to periods of warmth. Autumn reds and yellows appear in the foliage, the sap recedes, and at last there is a day when the air is full of falling leaves. This withering and dying in the plant world is never interrupted by a real renewal of life although there are warm periods during which the cold northern air masses are forced back again temporarily. In the autumn the lessening of warmth ends in the winter sleep of the plant world under a covering of snow.

The northward movement of spring, due to the ever increasing power of the sun on the earth, the southward movement of winter, following the withdrawal of that power, proceed at irregular intervals as northern and southern air masses are contesting their dominance over the north temperate zone. There is a constant movement of the air from the west to east due to the earth's rotation. Within this general movement contests take place between northern and southern air masses. The results of these contests have their effect on the individual man, his work, his thinking, and often his fortunes. The great storms have often been decisive in the outcome of sea and land battles and so have played an important role in human destiny.

The ebb and flow in the weather throughout the year became in time the main theme of these paintings. While there can be thunderstorms in mid-winter and snow and hail in summer, the clouds of mid-winter are predominantly of the horizontal type – the various forms of stratus. The characteristic cloud of summer has a vertical development and has its culmination in the great cumulus congestus and the cumulonimbus. Many types of clouds which at other times may be seen separately are found closely gathered in a single cumulonimbus build-up. At the base are whirling fractostratus and nimbostratus, then low cumulus, altocumulus, and, rising to thirty to fifty thousand feet, columns of cumulus consisting of snow and ice crystals. At the lee of these great domes lenticular clouds frequently develop, just as these form in the lee of high mountains. The cumulonimbus is the most difficult cloud to paint. It has defied me for many years.

When I was making animal drawings and had a tiger as my subject, I felt that I had to identify myself with the force that *is* the tiger. One can feel a growing link with the animal when seeing it at close range repeatedly or when feeding an animal that has been caged fresh from the jungles. A force streams out of it as it unwillingly faces the human eye, and it is as if one were absorbing this force and is so enabled to draw the creature. The closer one can be to the animal, the greater will be the life in the drawing.

In a comparable way there are unseen forces active in clouds which nevertheless affect our inner being and, if sensitive, one can feel this when within a cloud or near it. Mist, fog or a low stratus and nimbostratus are often close to us or surround us and we become one with them. We feel whatever forces are active in them surging through us and it is this intimate

contact which makes possible the painting of fog and mist with less effort than is demanded when attempting to paint the higher clouds.

The middle clouds, altostratus and altocumulus, are more removed from us; they seem to go their way apart from man. But when witnessing a build-up of a cumulus congestus, or, the greatest of all, the cumulonimbus, the thundercloud, we no longer are part of it but experience their immense power as something far beyond our comprehension. In this concentration of power, in the surpassing might and beauty of the domes of brilliant ice crystals, which seem illuminated from within, we are confronted by forces which are performing life-sustaining activities related to the whole life on earth. Indeed, to the one who fully realizes this to the very depths of his being, they are fulfilling tasks revealing a wisdom so profound he can only stand before these majestic domes with wonder and in awe.

Colour Plates of Cloud Paintings by Helmut Siber

- I Good Friday, 24th March, 1967, 8am
Dark fractostratus formed suddenly and briefly obscured the sun, dissolving immediately thereafter.
- II Good Friday, 8th April, 1966
After the rain, towards dusk. Dense, dark fog rose slowly and gathered powerfully over a low mountain.
- III Summer, 20th June, 1962, 5.30pm
Streamers of fog rising rapidly after a warm, gentle rain in the mountain-valley.
- IV 4th June, 6.15pm
During a thunderstorm. Cloudburst over the summit – the effect of the mountain barrier.
- V July, 1962, late afternoon
Growing Cumulonimbus at the height of summer.
Low, dark clouds are drawn rapidly towards the rising domes of the centre of the storm. These high columns consist of ice-crystals. They may reach 30,000 to 50,000 feet. At these heights lightning strikes from cloud to cloud within the storm, or out into space.
- VI 6th July, 1964, 5pm
The end of a turbulent day.
Six cloud forms can be discerned at this phase of disintegration. In the centre an aging cumulonimbus has thrown out cirrus above. The darker clouds are cumulus, fractonimbus and fractostratus. White fog hovers in ravine.
- VII Autumn, late September, 1963, 6.30pm
Cold wave from the north breaks over the mountain range with storm-force winds. Intense green, where cloud-masses part, indicates severe cold aloft.
- VIII 3rd October, 1963, 6.15pm
Effect of mountain barrier.
Rain-bearing air is forced up and forms layers of lenticular cumulus above the summits.

WORKING IN A SILVER FOUNDRY

Helmut Siber

In the region where I lived I repeatedly encountered men who were said to have become invalids in a large silver foundry. I was unable to confirm these rumours through any published material. It was said that the men suffered gas-poisoning, became blind, consumptive, even insane. Such reports were of great interest to me. I spoke to an acquaintance, who held a high position in the foundry, asking him to use his influence to let me see the conditions there. It was customary in most industrial works to allow access to interested people, as long as the work process was not disturbed. No one, he replied, apart from those who work there, is ever allowed to enter; there are no exceptions. Hm, so one must work there in order to find out what is going on! I spoke with my Norwegian friend. Early one Monday morning we cycled to the refinery.

For miles around one could see the work of the gas which escapes from the blast furnaces. It smelled sickly-sweet, and lay in the throat like a slow corrosive. The vegetation was stunted. The houses of the workers were grey and dirty, the people looked pale, consumptive, emaciated or bloated. Most were of Slavic origin, and lived here with their families. The faces even of the children were ugly, and bore a tormented or vapid expression. The gas-laden air was destructive to body and soul.

On the street-corners people are standing in front of bars, or sitting on doorsteps. They have bespat the ground all around them. A Pole is leaning against a house wall; he calls a few words after us, then turns and laughs as only a madman can. We are already two blocks further along, but the laughing seems to have nested behind us in our bicycle wheels, again and again we hear similar tones. 'Do you think they'll take us on?' I asked my friend. 'Do you think we'll get out again in time, before we too become mad?' he replied.

The waiting room is already full. The men speak but little, and then in Hungarian, Czech or Polish. We stand in the crowd and wait our turn, like the others. The air reeks of gas, mixed with the smell of bad tobacco and old clothes. The office window claps open, an employee surveys the men with a critical eye. We are standing too far back to be seen. He chooses about a dozen, and a space opens up between him and us. 'Hey, Scandinavians?' 'Right.' 'Come in.' We get cards for the physical check-up. This goes quickly, the doctor only looks at each man's chest. Half are accepted, ourselves among them.

We have night-shift. The fire of the blast-furnaces reddens the sky far around. Drowsily, following the call of duty, the slaves arrive at the gate. Mechanically, they stick their cards into the slot of the clock. At 11.30 the shift begins. The iron gate is shut behind us and bolted. Guards pace up and down by day and by night. The plant is closed to the public.

The odour of gas which surrounds the foundry becomes an intensive, nauseating stench. The workers in the silver department have to undress completely and pass by a guard, go through a wash-room and then pick up their work clothes, still damp with sweat from the previous shift. The crew in the fire room, to which we have been assigned, are given rubber shoes, leather gloves, protective glasses and gas masks. This equipment remains the property of the foundry, and is passed on from one man to the next at the changing of the shift. At the end of the shift one marches again naked through the wash-room, washes, passes a guard, and goes into the dressing-room, where one's own clothes are shut in a locker during the shift. All this for the prevention of theft.

The men whom we are relieving seem satisfied despite exhaustion – they have survived! A part of the crew goes to the acid room, another part into the courtyard, and the rest to the smelting room. A spongy foreman tells us what to do. After we have received his instructions he says, 'Only in case of emergency should you move quickly, otherwise do everything as slowly as possible, so as not to swallow too much gas'.

The smelting room is round and domed over, and contains four large smelting furnaces, the noise of which (oil and compressed air firing) drowns out the human voice. The ores are brought to the factory docks in trains and ships, for the works are situated on a canal. The metals are separated and cleaned in repeated stages of processing. First they are driven into the smelting room. We shovel them into great iron funnels, which are lifted by electric motors and steered over the furnaces. While the oil is boiling in the furnaces the ore is tipped in. One can see next to nothing, for the vapour and smoke that pour out of the furnace obscure the whole upper part of the furnace room. Our instructions specify that gas masks should be worn during this work, but in practice it is impossible to wear them in the searing heat over the furnaces – one would get no air at all, and would rather breathe the gases than suffocate. The whole machinery is antiquated, the furnaces are at the brink of collapse. Once they are filled, they are closed up again. Slowly the heavy clouds of vapour which had filled the whole furnace room disperse in dark streaming trails into the night.

As soon as the ore is melted, the bubbling mass is slowly poured off into two-wheeled carts with long shafts. The pouring is achieved with a hand-operated chain mechanism which tilts the whole furnace forwards, so that the molten metal can flow out of the fire-hole situated half way up. It often happens that the chains get jammed and the stream of metal flows on after the wagon is filled. The seething red-hot mass then streams over the wet

stone floor, and wherever it meets water in the cracks between the stones little explosions take place. Fiery balls of metal are strewn all about. The intense heat of the overflowing metal drives the workers out of the furnace room. In such moments the heavy rubber shoes render good service in protecting the feet from burns.

The metals are separated as well as possible during the pouring operation, the lighter ones flowing off first, the heavier ones later. As soon as a cart is full one of the men pulls it out into a corridor, where the metal is cooled and solidified. Once it has hardened, the carts are tipped over, and the metal dislodged with sledge hammers. The contents are transferred to the next furnace, and the cleaning process continued. After repeated smelting and cleaning, the silver is poured into ingots and taken to adjacent rooms for further treatment.

The first men who found work in the factory were recruited in southeastern Europe by agents of the firm, and imported to America with their families. They were lodged in the ugly block-houses of the firm. There they live, cut off from all outside life, and continue to speak their own languages. If the sons do not manage to find work in other industries they are sucked up by the factory and are chained to it for life, or until they are used up. The first months are agonizing, but gradually they become stupefied. Years pass – they have accepted their lot. Such is the fate of all the men here, – they feel how the poisons are consuming them, and are too weary to tear themselves free. The influence of the acids, fumes and heat emaciates or bloats their bodies. The will is paralyzed, the thinking impaired. Many fall victim to drink. They work 365 days a year, the times of the shifts change weekly, and at every change they must work double shift, since their new time joins up with the last. There is no rhythm in their lives, they are constantly slung back and forth. With the years they can no longer imagine that they are fit for any other kind of work. The conditions to which they are subjected, especially the devastating effects of the gases, have extinguished their self-consciousness. To be sure, they would have a hard time finding other work, for the signs of disintegration of mind and body become apparent after a short time.

One day, when a furnace had just been filled, and we were waiting for the fumes to disperse, I asked one of the workers – the only one who spoke English – 'Why don't you leave this place?' He stared at me in amazement, then turned away and rammed his sluice furiously into the fire-hole of his furnace. Then he pulled it out and flung it noisily onto the floor. 'How can I? – I am no longer fit for any other job. I save every cent so that my children won't have to work in this damned foundry!' At this moment a man emerged from one of the fuming passageways between the furnaces. 'Look at him there, he gave up the ghost long ago.' True enough, if a skeleton had come out of the passageway, it could not have spoken more clearly. His skin hung on his face like that of a drowned man, and had the

colour too. His body was stooping forward, the haggard arms and legs seemed to hang from his trunk. He was half naked, and a mighty chest seemed to be nearly all there was to his body. His breath reeked of gas, his body odour was gas, the watery, drowsy eyes which seem obscured behind a veil were – gas. Yes, even the locks of hair that fell over his flat, broad forehead spoke of the slow-working poison. He stood in the middle of the room and grinned at us. Then he shuffled back behind the furnaces, where he had to remove the slag. He has been working for 20 years behind these furnaces in the gas-filled passageways where neither fresh air nor the light of day ever penetrate.

After a few weeks my friend and I felt more and more exhausted. We slept but a few hours each day, since the ever-changing shifts did not allow us to come into a rhythm. We used our free time working in the garden to counteract the effects of the gas.

Once when we were on night shift my friend had to cool off a pile of glowing ingots of silver by spraying it with water. Confined by the narrow corridor, he stood close to the ingots, and his figure now and then disappeared from view behind the clouds of steam. I had to operate a furnace in the smelting room and felt anxious that he might nod off while standing and fall over the ingots. Suddenly I said to myself, 'He will fall asleep for sure!' I threw down the sluice and ran over. Sure enough, there he stood asleep, tottering forwards like a drunken man, then reeling back again. I jumped between him and the ingots and awakened him. 'If you tumble over forwards you are finished!' He laughed as though half conscious. I took it as a warning and began to look around for other work in my free time. As winter was approaching, people were being laid off everywhere, and we could only afford to give up the one job when we were assured of another. Each of us had dependants to support. I felt how the tentacles of this devilish factory were beginning to wrap themselves around us. I saw how we were gradually losing contact with other people. We avoided conversations, so as not to impose our reeking breath on others, for we knew well how foul the smell was, being reminded of it each day when we left the factory. The fresh air into which we rode on the way home seemed to us infected with this sickly sweet stench, for a reaction had set in, and we smelled the gas when in reality we were breathing clean air. But we knew that the same smell tainted our breath, and we avoided meetings with other people, who did not work at the factory.

In any case we had to get out. We began to mistrust ourselves, and each one asked the other whether he had noticed on him any signs of the poison's effects. My friend, the only person who spoke openly to me, could see no changes in me or in my actions. It may be that my Niagara cycling tour had given me more reserve strength, or that being younger helped me to put up more resistance. Although we had only been in the foundry for two months, my friend was fundamentally changed. He, who spoke five languages, who

could think with uncommon clarity, and was practical and resourceful in life, began to forget everything. Often he could not remember from one minute to the next. He could walk out the door with a shovel, and then come back and ask what he had wanted to do with it. This was quite new in him. I had known him for seven years. He had held responsible positions in banks in his home country. That was gas!

A young Hungarian also appeared daily in the furnace room. He had a heavy, fat body like a Japanese wrestler. He placed a hundred-pound iron weight on the floor, tied a rope around the handle, and slowly lifted it with his teeth. A man beside me said: 'In a few years he won't be doing that any more.' The young man protested, saying that he would only stay long enough to be able to return to Hungary. 'Do you think I wanted to stay here when I began five years ago?' answered the other.

The foreman seldom showed himself. He was of stocky build, his body seemed bloated and soft, his facial features reminded me somehow of the face of a bat. When he spoke at all it was to say he had headache. Only once did he say something different. The only thing he ever did in his free time was to race along a particular stretch of road in his car, often many times in succession, for that was the only thing that gave him relaxation, and he couldn't drive fast enough.

There were other remarkable figures, who for the most part showed the influence of the poison in a 'comical' way. There was only one whose person was dignified by an uncommon earnestness. A Hungarian, a fireman, around 40 years old. A tower of a man, once of Herculean build, now a wasted colossus. The first impression was: this man does not work in the furnace room to serve the factory, he is not its slave, like the others, – he is waging a battle of his own.

He has a 'life sentence'. He has already served 15 years. His face is long, pale and grey, the mouth drawn by pain. The eyes are surrounded and seemingly obscured by a grey veil. One cannot see into him, one can discover nothing of what lives behind those eyes. It is as though he were not at all in himself with his whole being, but only the great hulk of his body were held up before the fires by a tremendous power of defiance. Almost unceasingly he gazes into the seething, white-hot mass of silver in the furnace. Does he see there the Demon with whom he has struggled for 15 years? Fifteen years, and still the routine goes on.

The Demon is unrelenting, again and again he puffs waves of heat out of the furnace, consuming the oxygen which his opponent, – the Man who *will* not collapse – needs to live. He hurls out glowing balls of silver which burn little holes in the Man's skin before he can shake them off. He blows out thick poisonous fumes which arrest the breathing and deposit themselves in lung and brain.

The man has been wrestling with the Demon for 15 years; countless other firemen have already broken down under the repeated attacks, others have

lost their sanity or gone blind during these 15 years – gradually they all succumbed and lost. He is still standing, as though he knew the deeper meaning of his destiny. Will he stand the test?

But the 15 years have taken their toll. Often, when ever new waves of gas and heat come surging out of the furnace in quick succession, he suddenly turns away and walks with long strides to the grating which encloses the smelting room to prevent theft. He clings to the rusty iron lattice with his haggard, sinewy fingers, craning his neck to draw in the cool night air. His hands let go of the grating and press against his skull, his head must ache fearfully! He opens his mouth wide as though to cry out – the last teeth which the poison has not yet consumed become visible – but no sound escapes him. His cry would surely be terrifying. Then he walks back into the furnace room with the same long strides, stands once again at his place and glares into the glowing fused mass. The downward drawn mouth is distorted into a laugh – not a pure laugh, more of a mixture between despair and scorn.

Standing close to him one seems to hear a dialogue unfold between the two tenacious opponents – the Man and the Demon. The two enemies standing face to face know each other perfectly – but they are both too tough to succumb. Both laugh. 'We will get you', grins the One out of the furnace. 'I shall still fight', says the Other, the Man. 'But we will get you yet, there! take more gas, and there! – heat – gulp it down!' He gulps. 'I am still standing'. Fiery balls spray out of the furnace. 'May they blacken your skin!'

If one backs away, or leaves the smelting room altogether, the dialogue fades, one only sees the Man, who shakes the little glowing balls off his body, and then stands once more gazing into the fire – quite upright. This is what infuriates the Demon so unspeakably – this upright posture, this face, already half like a death-mask, yet still unbowed. He will become a warrior of Michael.

This had to be written. No one knows of this battle which is being fought out in the smelting-cave, utterly cut off from the outside world, – yet his destiny is the destiny of humanity in the twentieth century. When we take a few steps back, perhaps out of the room altogether, and observe through the door, – do we not see humanity standing – not completely upright, not yet Michaelic, – and the Demon laughing in the furnace? Is this but a picture, or is it reality? Truly, it is reality. We are called upon to see it.

After 2½ months we left the silver foundry. I had some commissions to make posters, and my friend found a different job.

Three years later I was again in the vicinity. I was on a cycling tour to make photos of the bridge and the silver foundry. The bridge was finished and spanned the river in an elegant arch. Four miles away lay the silver foundry, enveloped in eternal smoke. I climbed onto a railway freight-car

outside the works, and took pictures over the wall. An alarm bell rang in the guard-house by the entrance gate. I ducked between two railway cars and exchanged the film I had used with a new roll, which I wound into the camera up to the last number, so that it appeared to be used. I had hardly finished when company detectives came racing up to me in a car and detained me. They took my address and ordered me to take the film out of my camera. I did so willingly, they took the empty film, and I had my photos developed the next day in New York.

It should be mentioned that the family which owns the foundry, and many other similar works as well, is one of the most respected 'philanthropic' families in the United States. About a year after these events I was invited to a tea-party, at which a lady of this renowned family happened to be present. After I had shown some of my paintings from East Asia, she asked if I had won the X-prize for painters (a prize endowed by her family), and had thus financed my travels. Her question, but especially the tone in which she asked it, was so shameless that I had to summon up all my self-control merely to give the cynical answer, 'No, madam, I didn't need the prize, I earned my travels myself'. Perhaps she felt in the tone of my answer that I knew all too well *how* her multi-million dollar fortune had been amassed. She vanished at once from my sight.

October, 1927

Translated by John Meeks

ONE DAY AFTER CHERNOBYL

X. Y.

A small attic flat in a German town, a roaring fire in the old-fashioned stove, a big bunch of flowers on the round table: afternoon tea with a young couple who invited the mother of the young woman who expects her first baby. It is very peaceful on this Sunday afternoon, April 27th, 1986. Towards 4pm contractions begin strongly and rhythmically, gaining rapidly in intensity. There is no panic, only joy and anticipation of the long-awaited child. To distract from the pain the father-to-be reads from an Irish novel full of comic scenes and they laugh together.

The midwife is informed, a bed made ready at the alternative clinic where the 'gentle birth' will take place. Everything is packed and the small basket with the tiny clothes, the sheets and a suitcase carried to the taxi. It is 11 pm when the young couple leave and just time for a hot bath before the final

stage of labour begins. 'The head! I can see the dark hair!' cries the father. But a sudden panic seizes the girl who feels drained of all strength, utterly exhausted. 'Put it back, I am not ready for it. Please push the head back!' But the child wants to be born and when the words 'It's a girl!' reach her ears she is overwhelmed with joy. How much they both wished for a girl! The name has been waiting for a long time and when the child is washed and clothed the grandmother is informed: N— M— is born at 0.28 Summer time, 28th of April, a Monday. But the true birthday is Sunday and it is a Sunday child indeed: rosy and round and peaceful with a beautiful head and long, delicate fingers. Oh the joy of it, the glowing pride!

But it is hard to leave the clinic in the early hour of this cold Monday and climb the many steps past the flats where the Turks live, their pairs of shoes lying in the passage in front of each door; up and up where the warm bed is waiting, a cradle with silk veils and a hot plate of porridge.

Unknown to this little family a cloud is drifting from Russia to the North, to Sweden, then back South and spreading rapidly across Poland, Germany, Holland and over the Channel to Britain. One cannot see or hear or smell or taste what this cloud is bringing into Europe. No previous experience has prepared the population for the silent disaster coming out of Chernobyl, a place nobody has even heard of before. But in the warm little flat there is no TV, nobody listens to a radio or buys the papers. All the attention is focussed on the unfolding of this tiny, beautiful child. Music is played every day and friends come to sing, flowers arrive and a candle is lit at mealtimes. Sophia is thriving. On the first of May the child turns yellow, it is the day on which the first news of the terrible disaster reaches the family. Now would be the time to take the baby out into the sunshine. Sun is the best medicine against hepatitis; nature provides hot, cloudless days and after the cold Spring everybody longs to go out. But NO! The grass is polluted, the air contaminated. All fresh local vegetables are tested and withdrawn, the milk is no longer safe to drink, even the sandpit at the end of the street is dangerous and children have to be kept indoors. The government is unprepared and the official announcements are confused. The press aggravates the situation by printing sensational stories, the Green party goes over the top in accusing, condemning and blaming everybody.

During all this time I happened to live in the house of the Christian Community where the Act of Consecration of Man is celebrated almost every day. Coming from Britain I had never heard the Easter service in German and I listen hungrily to the beautiful words. 'Frohlocken' is repeated again and again; it means rejoice, and I feel uplifted, blessed and strengthened by the daily communion, the bread and wine, the strong fellowship with people I had never met before.

When the service is held on Sunday a week later there is a reality of faith, a living presence of the Christ, an active participation of the Holy Spirit in our lives. We cannot creep into bunkers to hide from radiation, but we can

build an armour around those we love woven of courage, truth and hope. Yes, the dangers are there, and the threat from radioactivity is real. We have an immense task before us to make the planet earth safe for the future, but fear or hate or panic only aggravate the situation. Here in Germany parents flock to hear a lecture by an anthroposophical doctor who speaks of the mobilisation of inner forces, of combating evil with good, of building strong communities and changing our lifestyle away from complacency towards wakefulness. An active inner life, filled with prayer and meditation, can do more than any medicine, he said.

Among human beings reaction to radioactivity varies considerably. It was reported from Hiroshima that a group of devout monks suffered much less from the effects of the first atomic bomb than the inhabitants of the same area who led an externally directed life. At the time it was supposed that the purely vegetarian diet they consumed was the reason for this, but I suggest that it was their piety, their spiritual work and cheerful mood that played just as significant a part.

Here a strong lobby against nuclear power stations is accompanied with efforts to reduce dependency on electricity. Parents begin by building hay-boxes to cut cooking time. Men wear unironed shirts, women stop using hairdriers and other electric gadgets. Coffee is ground by hand. It is almost fun to engage in this game. Rain, rain, rain. Whilst the first rains after Chernobyl aggravated the fallout, these warm spring rains begin to wash away the traces of radiation. The earth is the best filter for the dangerous stuff that fell from the sky. Ascension is coming: 'Himmelfahrt' in German. Did Jesus not promise to come in a cloud? Will we be equally unaware when he returns? Will mankind wake up and learn to experience a new Pentecost, a true Whitsun? How rich is the spiritual world, how narrow do we let it become through fear and ignorance.

The very courage such a soul as that of N— M— displays by the choice of her birthday can give us hope. She is thriving in spite of all the dangers around her. The shield of prayer, and the beauty, truth and hope which live among parents and friends protect her. Christ is Lord over life and death.

THE FUTURE OF CIVILISATION

Nick Thomas

We are faced with two obvious dangers to the future of our civilisation: nuclear war and nuclear accident. The latter has been graphically illustrated by the accidents at Three Mile Island and Chernobyl. We are not only faced by a reversion to barbarism or primitive conditions, but even of the end of life on Earth as we know it. The causes of this situation are too easily seen in a narrow material way rather than as symptoms of the spiritual condition of mankind.

First nuclear power. Apart from the gross dangers there are also others, particularly those of waste disposal and low level radiation. Much work has been done on waste disposal, none of which is entirely satisfactory. However well sealed or otherwise packed the waste may be, dumping it in any way constitutes a risk. We are notoriously unable to predict the larger vicissitudes of Nature, which in the long term could lead to the waste deposits being disturbed in a potentially harmful way. Another aspect of this is that our political future is far from secure, and a break-down of civilisation could lead to a loss of knowledge of where such deposits are, and quite quickly even of what they are. We need to be prepared to think of such possibilities where we are handling such dangerous substances.

We do not know the long term effect of low level radiation in the atmosphere. It is often said that the contribution to this low level background radiation by nuclear power stations is so small as to be negligible. That is an assumption, for the long term effects are unknown. It may be argued that the risk is so low that it is acceptable. Acceptable to whom? Those who have the responsibility to satisfy present industrial and consumer needs for energy? Or those whose children must inherit the world we bequeath?

The advent of nuclear power thus poses us a significant challenge, and there is no right answer for everyone as to how we should meet it. What is clear is that our ability to handle advanced technology demands of us considerable advancement morally. It may seem to many that to expect such an advance is wishful thinking. The existence of dangerous but useful technology does not only challenge our leaders, but all of us. The present enormous demand for material comforts in Europe and the West is a powerful force demanding action of those given the problem of meeting it. It is hardly surprising that all kinds of solution are examined. Rudolf Steiner envisaged the challenge presented by advancing technology, and suggested as a solution the adoption of what he called a Threefold Social Order. He

predicted that mankind would discover immensely dangerous forces which could only be used rightly if our moral advancement matched our technical one. He proposed not a utopia, but a way of arranging social life so that the good moral forces which are evident in mankind could play a much greater part than is possible now. This requires that our industry be constrained to produce what we as a community determine we really need, as opposed to allowing it to 'free run' according to market forces often divorced from those needs. The use of massive advertising and the existence of special-interest lobbies are notorious indicators of how far away we are from this. Essential to Steiner's view is the notion that human beings are spiritual beings, which means they are much more than mere consumers. Progress derives from the exercise of our spiritual capacities in the form of initiative and individual ability. A true middle realm is required to enable the possibilities offered by the spirit and the resources economically available to be matched, just as the soul weaves between body and spirit. Here our human rights must be cared for so that we neither become cogs of a huge machine — as workers — nor slaves of the state in our artistic and cultural strivings. The cultural, political (or rights) and economic activities of mankind each need to follow their own legitimate laws. Currently we see politics in a far too dominant position in most if not all of the world. As a result the creative capacities of mankind are channelled predominantly into military and political channels, or into shoring up invested interests in various industries.

Steiner's ideas were propounded in the first quarter of this century, and the detailed way in which he envisaged their realisation applied to conditions at that time. However the underlying principle, based on the soul- and spiritual-nature of human beings, is no less true today than it was then. He envisaged independence of the three spheres discussed above so that on the one hand human beings were not treated as mere economic entities subject to political and industrial whim, and on the other human creativity should be allowed to develop in freedom. *If* it is really free then, he claimed, the true needs of the time could be met from those sources. The middle sphere of life would confine itself to seeing that our communally recognised rights were respected. In this kind of community the best in human nature could flourish, for the need to work and the need to be creative would find their proper expression.

In such a setting the control of technology becomes possible in a healthy way. This is true, however, only within a nation or state. The nuclear problem affects the whole world, as is graphically illustrated by the Chernobyl accident. To solve a worldwide problem requires more than the revision of one or two regimes here or there. That would be a very welcome start, but more is possible. Economic interdependence of different countries can have two broad effects: at first it is stabilising as the dependence of each on the other discourages conflict. However, if that dependence is misused to

apply pressure in any way then war can rapidly ensue. For example, if one world power depends on another for food, and finds that dependence embarrassing it may resort to war to circumvent the problem. A true world economy would need to be based on the wish to serve each other at an international level, each producing that commodity (free from competition) for which it is most suited. World aid programs are sometimes viewed as counter-productive because the economic *independence* of the countries helped is apparently undermined. How differently this could be viewed if we had a real world economy!

This should not be confused with communism, where there is no less confusion between the three spheres of human life than there is in the capitalist countries. Broadly speaking we may recognise right wing regimes as giving undue prominence to the value of individual initiative to the detriment of those compelled to perform labour, while in the left wing regimes the ideal of fairness for all is allowed to undermine the value and importance of the individual. Individual initiative and genuine commonwealth are both important, as trends on both sides of this 'divide' show.

The urgency of the nuclear question requires us to examine new directions that tackle the real problems rather than to dismiss all new ideas, such as the above, as being impractical. How 'practical' is a situation that puts us in our present peril? The real problems are not, as already suggested, only outer ones. They are posed by the development of mankind, not by some sudden emergence of natural forces. We have discovered radioactivity and found out how to use it through a technical advance that is unfortunately not paralleled by a commensurate inner development. Our material needs and comforts are allowed to dominate our inner ones. It is so often the case that the real solution poses the greatest challenge: control rather than onesided extremism. Many examples of hijacking have shown this, where those responsible have had to endure the agony of the controlled approach rather than the extremes of either giving in or over-forceful reaction. Control of our appetites and demands rather than either their suppression or total gratification are needed if the demand for energy is not to grow further. This needs to be complemented by the control of industry to produce what we really need rather than to waste energy on the production of so much that is patently frivolous. That in turn will also regulate the amount of power needed.

Even then some new source of energy will be needed when coal runs out as is well recognised in the search for renewable energy sources. Nuclear power may be necessary for a time until an alternative is developed. We need not flinch in the face of this if we face up to our problems.

Turning now to the threat of war, it is only too clear that another spiritual cause is at work apart from others, namely fear. Why is fear so powerful a force that enormous budgets are expended on arms? World domination has been attempted by economic means in the West and by forceful means in the

communist block. In the West we rightly repudiate the threat to freedom implied in communism in its present form, but how well do we ourselves understand the true meaning of freedom? Our enormous material appetites already discussed show that we are apt to confuse freedom with licence. But the demands made on industry do not arise from this source alone, and the cynical attribute the impetus driving it to the production of armaments. It seems like an old story: the twin evils of fear and greed. What is not old is the scale on which it is happening.

The danger has traditionally been seen to arise from wholesale radioactive pollution together with the spectre of radiation sickness and mutation among any survivors. A new threat has been recognised recently from the so-called nuclear winter. Vast clouds of smoke produced by the burning of combustible materials in major cities could severely reduce the heat from the Sun, leading to ice-age conditions all over the Earth. This would last for about 15 months to two years. The scale of the problem is not certain from the computer predictions, but that is academic as even a small drop in temperature of 3 to 5 degrees Celsius at the critical time in the agricultural cycle would cause the wheat crops to fail, while a fall in temperature below 15 degrees at any time during the growing season would cause the rice crops to fail. These are the findings of the Scientific Committee on the Problems of the Environment.

These findings further contribute to the fear stimulated by our present condition. Fear arises whenever we confront the spiritual world, particularly through self knowledge when we shrink from the responsibility to change ourselves that it implies. It is just such a change that is required of all of us. The spiritual 'pain-killer' for fear is materialism, where we comfort ourselves by denying the embarrassing promptings of the spirit. The truth of this can be tested by anyone who is willing to seek self knowledge in the way Rudolf Steiner has pioneered (Ref. 1). The strength of the fear driving the arms race too is rooted in this spiritual cause – so great because so little understood – which also leads to the materialism manifest in the arms race, where the fear of aggression is countered by an enormous stock-pile of deterrent weapons. Really effective progress in disarmament would be possible if both sides of the iron curtain could recognise the true nature of the human being, for the spiritual causes could then be seen through and countered in a more appropriate manner.

There is every hope that we can avert the consequences of our present situation if we seek the truly human in our fellows, communist or capitalist or whatever, and build on that instead of upon the fear of their right to exist in their own way. This would remain a naive platitude, however, without the backing of true spiritual knowledge.

NUCLEAR ENERGY Not an Earthly Paradise

Georg Maier

A style of life has developed in the modern industrialized countries which is based on the massive consumption of energy. We are confronted with a flood of industrial and agricultural products. To encourage their sale, advertising has been developed as a new branch of social life. Goods and persons are transported by air across the globe as a matter of course, while the motor car, now available to all social strata, has given birth to an extensive road network for long and short distance travel. Houses and apartments are kept at a pleasant temperature independent of the seasons. Many working premises are even windowless, the sunlight being replaced with the cool, uniform glow of fluorescent tubes. Countless people find their main interest in the second-hand experiences of television, which they watch at home from their armchairs, or even on intercontinental flights.

It seems remarkably difficult to realize that this style of life depends upon two mutually contradictory premises. It demands its own intensification (economic growth), and by this very process undermines the natural foundations which have supported humanity throughout the millennia of its existence. Moreover, the distribution of the blessings of civilization seems limited by insurmountable barriers. Only a fraction of the world's population can hope to attain to a standard of living which people in the industrialized countries have come to take for granted. For neither the environment nor the reserves of natural resources allow for a similar per head consumption of oil, gas or coal in the developing countries. The natural 'limits of growth' were already laid down 15 years ago.

What does it mean to save energy? We can only experience energy directly through the work we perform with our own bodies. We become most acutely conscious of it when we meet our physical limitations. Painful exhaustion takes hold of our limbs, the activity of heart and lungs increases, and demands our attention. Weakness and hunger overcome us. On the other hand, we learn to value the refreshment of sleep, the fortifying power of food. The foundation of our life in the alternation of waking and sleeping becomes manifest, and at the same time our inner connection to the plants, whose growth through the sunlight sustains our own life-activity. Originally, man's life was intricately woven into the great life-organism of the Earth.

This planetary life in turn followed extra-terrestrial, cosmic impulses which permeated earthly processes. Man was not yet an independent being. His situation at that time is characterized in the myth of paradise. The fall and expulsion from paradise are motives which have occupied humanity ever since. In the following considerations of the history of civilization and technology, I would like to keep this motive in mind.

Already in very ancient times, man harnessed the power of domesticated animals. Their bodily strength derives from the same sources as our own. The force of the wind was added to that of the oarsman. It was also used to drive mills. While wind-power relied on fluctuating meteorological processes brought into action by the sun, the power of flowing water proved more dependable in driving simple machines. But the movement of rivers and streams is also a direct consequence of changing weather conditions in the course of the year.

Fire

Already in pre-historic times man added fire to the natural gifts of light and warmth imparted by the sun. This made him less dependent on the immediate effects of the sun's movements. At the same time, fire gave him the power to transform the products of nature, to adapt them to his needs. Thus he could render his food more digestible through cooking, by burning limestone he could make mortar, through the reduction of ores he could win metals. Fire is, by its very nature, a process of transformation. It consumes the substance which gave the plants their life. Similarly, the process of metabolism is akin to fire. In placing fire in his service, man took an important stride away from the protecting womb of nature. In myth, Prometheus personifies this deed of liberation. He rebels against the gods. But with his emancipation from the original wholeness of all natural beings, man implanted into this wholeness a lethal poison, the effects of which can be read in the destruction which once blossoming cultures have left behind. For right up until the most recent times, plants and animals remained the almost exclusive source of fuel. And so, civilization was still held within the dimensions of natural life. Nevertheless, lack of moderation found its expression in a heritage of deforested and eroded land.

Coal

With coal mining a new phase begins. Technology now resorts to energy which does not originate in present-day natural processes. At the same time, with the steam engine, it succeeds in utilizing forces which man did not find given in nature, which he did not merely need to harness. He creates an artificial source of power for work after the model of his own organism, which similarly depends on the consumption of plant substance.

With this step we enter the epoch of industrialization. Within a short span of time motors of the most manifold kinds are invented with many times the work-power of a human being. These new slaves draw their strength from

the depths of the earth, from fossil fuels, which originated from the life of a far distant past. Through the use of fire the organism of the Earth had begun to be deprived of inner relationships. For man set processes into movement which did not have a natural origin. And yet the measure of these activities was set by the natural cycle of the year. Now, with the utilization of coal from the depths of the earth, man had to find a new measure. The laws of chemistry were discovered, which rest on the conservation of chemical elements through all reactions. In addition came the discovery of the concept of energy in the mid-nineteenth century. Julius Robert Mayer had found that the steam which drives an engine loses heat in the course of work – just as heat is generated whenever a movement is braked by friction.

Thus heat energy can be transformed into the energy of movement and vice-versa. In the possibility of burning coal in the atmosphere, a further 'hidden' energy is implicit, through which the sun once conjured plant-growth from the earth. There is no *perpetuum mobile*, energy merely passes from one state into another.

As measure, as order underlying natural events, only the principle of the conservation of matter and energy remains. In the abstract concept of energy every quality, every specification is lost. According to this idea, burning coal and falling masses of water from a dam have exactly the same effect. The sense for the reality of human actions is corrupted.

Thus it has become customary to balance out the use of energy for various purposes. Political economies have their quotas for energy consumption. The option has become prevalent that a high standard of living is tied to high consumption of energy. For the industrial countries the time is long past when man was content with the gifts of the sun as bringer of warmth and light, as creator and sustainer of plant life, as stirrer of wind and weather. But each new form of energy which is tapped brings new processes in its wake which modify the natural ones. Today we recognize many consequences of the disorder into which nature has been driven. The climate of the whole earth is changing, forests are dying in the polluted air, which in heavily populated areas can condense to suffocating smog. Particularly in our century, petroleum and natural gas have become the dominant source of energy, but humanity will only be able to still its 'energy hunger' for a short time from these subterranean sources. The reserves are diminishing, and their combustion is changing noticeably the composition of the atmosphere which determines the climate. Whoever is able to observe humanity from an adequate distance, is driven to the conclusion that it behaves like an addict, who is thoughtlessly eroding away his own life, merely to become more and more the prisoner of his addiction – in this case to 'energy'.

Electricity

A significant part of the energy in use today is made available in power plants to drive electrical machines. Countless electric gadgets fill the modern

household – from the refrigerator and heating pumps to electric razors and coffee mills. Modern locomotives run on electricity without smoke or even exhaust fumes. Lighting, entertainment, communication, automation and data processing are served exclusively by electrical apparatuses. There are even electrical heating systems. All these functions, which are taken so much for granted by modern civilisation, are made possible by means of electricity. Wherever electricity is consumed the network of power plants, extending over continents, responds with a corresponding production of energy. 'Trade' has erected an invisible barrier between consumption and production. We do not see the empty bed of a former mountain stream, nor the giant dredging machines which strip the landscapes where lignite mining is being carried on, nor the fumes of the smoke-stacks, when we consume electrical energy in our habitual way. For modern civilisation the access to a wall plug has attained a greater importance than the sunlight. The network of electrical cables stretching around the earth is increasingly assuming the character of a new 'cosmos' in which the social life is embedded. After all, the operation of all those functions which have become so vital depend on it. As soon as the electrical network fails, civilisation falls into paralysis. Chaos ensues.

Nuclear Energy

The social life, and with it the weal and woe of every individual, has become dependent today on the institutions of the 'electrical economy'. In the course of the twentieth century it has developed into a superpower with the character of a monopoly. In many countries it has built nuclear power plants in the course of the past two decades. And so we have come to be dependent not only on the supply of electricity, but above and beyond this, on nuclear energy. There are many people who resisted this and continue to do so. But even after the great calamity of Chernobyl, the powers that be are obstinately resolved on their chosen course.

Humanity is confronted today with its expulsion from paradise. It must attain a consciousness for its own development. For the further development of the planet is entrusted to it. Now, having come of age, it appears to have forgotten its origin. And so it lacks the criteria to assess the meaning of the step towards nuclear energy.

Whence does the new energy come? What is the nature of the step from fossil fuel to nuclear energy? What is become of the one measure of the original organism of nature which still remained in the nineteenth century? Why should this step have followed so soon in the wake of the industrial revolution? How is the tempo of the development of civilisation determined? Question upon question.

Radioactivity

The foundations of nuclear technology were laid under cover of strict secrecy during the Second World War. The detonation of the atom bombs

over Hiroshima and Nagasaki unveiled the secret. The world is horror-stricken by the deadly power of the new energy. Humanity is challenged to make moral resolutions. The figure of Robert Oppenheimer comes naturally to mind. He refuses to co-operate in the development of the still more deadly hydrogen bomb. And with this deed he makes himself the target of a government witch-hunt for 'un-American activities'. Since this time, every opponent of nuclear energy, and even of nuclear weaponry, has had to swim against the current. He is labelled an enemy of the system. From the beginning, government establishments have actively supported and subsidized the development of the new energy. Still today its conquests are made possible by state backing.

Radioactivity

The new energy is founded on radioactivity. When those principles collapse which formed the basis of physics and chemistry in the nineteenth century, radioactivity appears. It is generated when one chemical element is transformed into another. The order of the elements is broken. It falls apart into groups of chemically related, but physically fundamentally different substances: the profusion of 'isotopes'. Our world conception is now dominated by the 'nuclear' properties of matter. Radioactivity is practically possible in all substances.

How is radioactivity generated? One speaks of 'radiation'. The process can best be compared to a discharge of lightning during a thunderstorm. In the midst of wind and rainfall, an effect of an entirely different quality and intensity suddenly appears. Lightning can rip apart the ancient trunk of an oak; if it strikes a man it can bring instantaneous death. Energy is released suddenly and is spatially bundled into a narrow path. Similarly, 'radiation' produces hair-like tracks in photographic layers or in the cloud-chamber. In the Geiger-counter such an electrically conducting track permits a spark to pass over. Altogether, the ionization of the air forms the basis of dosimetry, the measure of radioactivity, expressed in the now all too familiar unit of the 'Röntgen'. Electricity thus provides 'substitutional percepts' for the imperceptible effects of radioactivity. Another important aspect to be borne in mind is the splitting up of the concept of quantity in measuring radioactivity. There is the characteristic strength of the single event, and alongside it the number of events which come into play. The intensive measure of radioactivity is bound to the nature of the substance, the extensive measure to the amount of substance present. Thus quite radical effects can still be generated by very small quantities of matter, only less frequently.

Radiation occurs through radioactive decay. This means that a substance is continually losing radiation potential while producing radiation. After a certain half-life which is specific to a substance, it has only half its original (extensive) radiation potential. And this process is actually accompanied by the transformation of one chemical element into another. The process of

decay cannot be influenced by outer circumstances. Unlike electrical conductivity and other physical properties, it is entirely unrelated to the conditions of the environment. At the same time, a new 'successor' substance replaces the original one. It too can have radioactive potential. Thus radiation is accompanied by chemically tangible footsteps.

Radiation can be studied as a physical process. On this level alone it does not give so much cause for worry. The worries arise when we consider its effects on living organisms. No life can exist in the presence of strong radiation. Higher organisms are more vulnerable than lower ones. Radiation disturbs the transmission of formative principles from one generation to the next. Thus the plant breeder can obtain mutants through radiation, descendants with seemingly random variations. He may even succeed in finding one among very many which serves his purposes. But first and foremost, radiation produces malformations. And this genetic effect takes place at all levels of (extensive) intensity of radioactivity. Altogether, radioactivity damages life on the level of cell structure. It causes the development of cancerous tissue, and at levels of extreme intensity, as in the catastrophe of Chernobyl, it attacks the organism where the greatest life activity is taking place, where new blood is being formed in the bone-marrow.

Radioactivity is naturally present in small traces. Thus radioactive carbon is continually being formed in the atmosphere. It is found in the fresh plant substances. Its steady decay makes possible the carbon dating method for determining the age of recent organic substances. In the fossil coal deposits it has already disappeared. At great depths below the earth's surface, amid the plutonic rocks, is found the heaviest element, Uranium, and the products of its decay, such as radium. Radioactivity was first discovered 90 years ago by Becquerel through his investigations of uranium ore. Marie Curie refined tons of this ore to produce a few grams of radium.

Nuclear Technology

Uranium provided the key to technical application. By concentrating an 'over-critical mass' of about 20 kilogrammes of the appropriate isotope, the first atom bomb was made. All that man contributed to the process was the concentration of matter in space. The violent explosion, equivalent to thousands or even millions of tons of conventional explosives, then takes place 'of its own accord'. In a reactor the same process occurs as in a bomb, only it is harnessed. Here too, uranium is concentrated to a 'critical mass' – but now in tons rather than kilogrammes. Fuel rods of uranium now form a loose lattice, the spaces being filled with a neutral medium. This has a dual function. Its properties as 'moderator' further the process. Pure graphite, for instance, is more effective than pure water. In addition comes the function of conducting away the heat produced by the fission of uranium in the fuel rods, in order to drive the turbines of the power plant. The process is

regulated by control rods, which contain a material (e.g. Boron) which inhibits the process. When they are withdrawn from the core, the 'critical state' is reached and overstepped: the process accelerates of itself with the speed of an avalanche. By sinking the control rods into the core, it is possible to stabilize the process at a planned level. All the components which have been described work on the basis of their material properties and their mass.

In the reactor, several processes take place at once:

Fission. Uranium disappears, and in its place appear many hundreds of powerfully radioactive 'fission products'. During about a year's operation, radioactivity equivalent to hundreds of atom bombs is produced. The fact that energy is generated is incidental. Primarily, the reactors are producers of unimaginable quantities of radioactivity. In terms of the dissemination of radioactivity, the catastrophe of Chernobyl was far worse than the detonation of large numbers of atom bombs in the atmosphere.

Breeding. From uranium which is not yet fissile, a new, artificial heavy element arises: fissile Plutonium, a substance still better adapted for use in bombs. Only five kilogrammes are needed. Not only does the process trigger and support itself; it is even able, as it were, to create its own material continuity. It is symptomatic that the term 'breeding' has been borrowed from biology to describe this process. Plutonium, as the 'offspring' of the reactor process, is an inconceivably powerful poison. It is this substance, more than any other, that gives cause for concern in the disposal of nuclear waste.

Activation. In the course of operation, the building itself becomes radioactive. Once the reactor has reached its anticipated 'life-span', the problem arises, what to do with it.

Generation of warmth. A by-product of the reaction. For this reason, atomic power-plants are built and operated.

Fire escapes from its rightful place: the reactor process finds its continuation in radioactivity. Nuclear reactors create radioactivity of a kind and degree that the earth did not contain. They are not just here for a short, transitional period, but are effective for a much longer span of time than we can survey in the course of human history. Plutonium has an estimated half-life of 24,000 years. Man's stride away from the limits set by nature is injuring the living world more sorely than ever.

Sub-Nature

It is thought possible to contain the radioactivity produced in reactors and the reactors themselves, and thus to protect the environment from contamination. Humanity would then have created a second world, isolated and unapproachable, which would have its own separate existence alongside that of nature. If we were in a position to judge our civilisation objectively, we would be compelled to diagnose *schizophrenia*. But something else is actually happening. Our civilization has created a realm which is growing

more and more separate from the natural world. To recognize this, we need only consider recent advances in the use of technology. Rudolf Steiner¹ characterizes this realm as *Sub-Nature*. E. M. Forster describes it in his short story 'The Machine Stops'.⁴ We are cutting ourselves off from the world. Our whole attention is given over to electrical apparatuses. The indication of the dosimeter is just as much a substitutional percept as a report on the television screen. We only became aware of the Chernobyl accident through measuring devices and the media. And we should not forget how little we really know about the true nature of radioactivity. Tolerance levels for radioactive contamination of food had to be invented ad hoc in the various countries affected. Such tolerance levels are neither established through insight (through thinking) nor empirically (through experience), but are laid down bureaucratically as arbitrary values. As an example, tolerance levels were set separately by each state in the Federal Republic of Germany. Only in the state of Hessen was this based on recommendations made by doctors. Characteristically, the limits there were set 25 to 50 times lower than in most other German states, and 100 times lower than in England! It must still be borne in mind, however, that even in such a case the limits are arbitrary, and do not correspond to a clear insight. We encounter the world through thinking, on the one hand, and through our senses on the other. In *Sub-Nature* these two encounters are lacking.

The course of human history into the present age, which we have sketched here with reference to the development of technology, is a series of events which call to mind the fall and expulsion from Paradise.⁵ In the eyes of the technocrats, technical progress is an end in itself. In the development of humanity, the Fall is not an end in itself, but an aspect of the progress towards the free human being, who gradually assumes more and more responsibility. The question of responsibility is more urgent today than ever before. We are all responsible now, not only the self-appointed authorities. It is beyond doubt that humanity can no longer be supported and nurtured by a god-given paradisaic nature. There is no way back. It is now our task to support the weakened vitality of nature through new, healing impulses. An arduous path lies before each of us. In treading it, we will encounter step by step the consequences of the deeds we have written into the world during the course of our descent from Paradise. Such healing impulses are at hand today. A time is dawning when it is no longer enough to know what is right, but when each one is called upon to live according to what he has recognized as right.

1. Dennis Meadows: 'The Limits of Growth', New York, 1972.
2. Rudolf Steiner: 'Cosmic Memory'. Transition from the fourth to the fifth Root Race.
3. Rudolf Steiner: 'Anthroposophical Leading Thoughts'. See page 00 of this issue.
4. E. M. Forster: 'Collected Short Stories', Penguin Books.
5. Rudolf Steiner: 'Occult Science, An Outline'. London, 1979.

THE ENERGY CRISIS AS A CHALLENGE

Daniel T. Jones

Many doubts and hopes remain about nuclear power after the accident at the Chernobyl plant in the Soviet Union. Fears and doubts linger about the longer term consequences of the radiation from Chernobyl and many worry about whether a similar accident might not happen elsewhere one day. On the other hand many will hope that this whole affair will mark the end of man's adventure with nuclear power. There is no doubt that the Chernobyl accident will have important consequences for the world energy economy, and not just for the Soviet Union. Even influential journals such as the *Economist* have carried leading articles acknowledging the feasibility of a future without nuclear power. To assess these changes we need to unravel the arguments and to look at the alternatives. However as the immediate events of the accident disappear from the newspaper headlines it is worth reflecting on this event as a symptom of more fundamental changes going on in our society. How does Chernobyl challenge us to look anew at ourselves and at the world we have created?

The expectations of nuclear power were already changing before the Chernobyl accident. In the 1960's nuclear power was seen as the only way to meet the rapidly growing need for energy in the industrialised countries. The 1973 oil crisis made nuclear power look more economically attractive than either coal or oil, after the price of oil quadrupled and supplies seemed to be limited in the future. However, 1973 also marked a watershed in the demand for energy. As the west recovered from the economic recession following the oil crisis it became clear that energy demand was unlikely to rise as fast as was previously expected, even if economic growth recovered. Apart from being more careful in using energy, economic growth from now on does not require as much energy as in the past. Because it takes about a decade to build a big power station the west found itself with a glut of electricity generating stations in the 1970's, as many plants ordered in the 1960's were completed. As a result decisions to invest in more nuclear power stations were shelved in many countries. Concern about nuclear power grew during the 1970's after a series of accidents, culminating in the accident at the Three Mile Island plant in the USA in 1979. Governments became much more rigorous about safety checks and approval for new plants became more difficult to obtain. Opposition to the siting of new power stations grew and demonstrations were in some cases effective in preventing the completion of some plants.

Nuclear power programmes continued with little interruption in France and Japan, both countries with no oil or coal reserves of their own. However many other countries faced mounting difficulties in ordering or in completing new nuclear plants. In the USA not a single new reactor has been ordered without cancellation since 1973, and 28 still remain to be completed. In the UK a Conservative government committed to expanding nuclear power has not ordered a single station since it was elected seven years ago. Austria and Sweden held referenda on nuclear power which voted against building any further plants and in Sweden not to replace existing plants when they reached the end of their lives in 25 years' time. As earlier optimism and impatience over nuclear power began to fade it was increasingly thought of as one of a number of alternative sources of energy for the 1990's and the next century, when many existing plants may need replacing. Chernobyl has shifted attention to those other alternatives and increased the odds against nuclear power.

What about the alternatives then? Despite fears of rapidly running out of oil and gas we discovered as much new oil and gas since 1973 as we used since then, with more likely to be found in the future. Coal reserves worldwide are enormous and will last for many centuries. The 1973 oil crisis turned out in fact not to have been about running out of oil but a challenge to wake up to how we were using it and how much and who we paid for it. It is also now thought likely that it will be cheaper to refurbish many old conventional electricity plants rather than build new ones. In the years to come sophisticated electric controls will also help to monitor and control the use of energy in the home and in the factory more accurately and efficiently.

One of the most promising of a number of alternative sources of energy is solar energy, using what is called photovoltaics. Scientists in many countries are probing deeper and deeper into the properties of materials such as silicon and how if transformed they are able to generate electric current from the light of the sun. For a long time these solar cells were very expensive and suitable only for satellites. However in Japan great strides are being made in mass producing solar cells and in improving their efficiency. It is very likely that solar cells will become both cheap and readily available in the years to come. Unlike other forms of energy they will not require big generating or processing plants or distribution networks. Instead they will be most suitable for generating small amounts of electricity wherever it is required.

It is interesting that this development in energy research parallels similar moves in other fields. It was the understanding of the secrets of silicon that lay behind the electronics revolution. Now great strides are being made in developing new very strong, very light and heat resistant materials from carbon and ceramics that will replace steel and other materials in many applications. What underlies all these developments is the transformation of simple materials like silicon and carbon and their recombination according to a conscious pattern modelled on the processes of crystallography, in the

process enhancing certain properties that can be used in different ways.

If solar cells become available cheaply in the future this could be of great significance for the developing countries, who will not be able to afford to follow the energy-intensive path of development taken by the existing industrialised countries. Not only would they meet the need for decentralised supplies of energy in countries with plenty of sun but they would require very little in the way of maintenance or running costs. The initial capital cost could of course best be met by giving them to the developing countries as part of a development programme. Despite the fewer hours of sunshine in the temperate climates solar cells can also generate quite efficiently on overcast days. Coupled with another form of energy for peak loads solar cells could well reduce the need for traditional non-renewable energy sources in the industrialised countries. They also move in tune with the increasingly decentralised lifestyles of our times.

If the answer is that there are plenty of alternatives, and others such as wind and water power could have been mentioned, we need no longer fear that we might after all have to depend increasingly on nuclear power. It is clear that weighed against the picture presented above nuclear power does not necessarily represent either an acceptable or an economic alternative for the 1990's and beyond. Great doubts have been cast on the accuracy or validity of the statistics measuring the risks and the consequences of nuclear power by the string of accidents culminating at Chernobyl. We still do not know the full long term effects of even low doses of radiation. In a majority of countries the cost of nuclear electricity is still not significantly below other forms of electricity and it is likely that the costs of decommissioning nuclear plants, processing nuclear waste and disposing of it safely have been underestimated. If, as in the past, the technical solutions to these problems are more costly than anticipated, then it is unlikely that nuclear power will prove to be the most economic alternative. Whatever the outcome nuclear power will not simply disappear. We will be living with the 536 reactors now operating or being built well into the next century, even if no more are ordered in the future. Research has hardly begun into how we can work together with the delicate forces in nature to enable our environment and ourselves to cope with future leaks of radioactivity. The Chernobyl accident for the first time made a wider public aware of the problems of measuring tiny elements of radioactivity in the air.

Awakening to the challenges posed by nuclear power has become a very important part of the growing environmental movement. Looking back one can see how concern for the quantitative aspects of the environmental crisis, outlined in the forecasts of the Club of Rome, have broadened to focus on the more qualitative changes that are influencing our environment. Concerns about the population explosion and food and energy shortages have given way to concern to clean up our rivers, to improve the quality of the food we eat, and how to clean up the air we breathe. To do so means that

we have to become aware of the ways in which the minutest, often invisible, elements work in earth, air and water. A purely materialistic explanation of their effects is often inadequate to explain what is at work in these phenomena. Only by understanding, becoming fully conscious of, working together with and thereby strengthening the healing forces in nature and in ourselves can we cope with the consequences of nuclear power.

Another aspect the energy and environmental crisis have brought home to us is the interdependence of the whole globe. This was again strikingly illustrated by the Chernobyl accident, the consequences of which spread quickly across national boundaries. This was one of those occasions where we could not ignore the situation because it did not directly affect us. Awareness of this interdependence and shared responsibility for the way we live on the earth is a very powerful force indeed. Agreement by scientists around the world that even a limited nuclear war would be followed by an 'arctic winter' through profound climatic changes has seriously undermined the credibility of these weapons. Chernobyl brought the people of the west and east together in a new way that made a mockery of the stale rhetoric of confrontation. It quickly became apparent that such an accident could equally well have happened in the west. The youth in the Soviet Union was for the first time also allowed to respond spontaneously to the accident by organising a charity pop concert to raise money for the victims. Whether it is for Ethiopia or the Chernobyl victims, young people are no longer willing to wait for governments to respond to these crises, often with too little and too late.

SPEECH AND BREATHING

Dawn Langman

When we walk through the streets of a large city we can become aware that we hardly dare to breathe in. So polluted is the air that we only allow ourselves to breathe very shallowly. However it is not only our sense of smell which affects our breathing directly. Our capacity to respond deeply through any of our senses is always reflected in a change in the rhythm of our breathing. The assault on our senses through the media has become an assault on our breathing. Not only can we not afford to look or hear anymore but we cannot afford to breathe in what confronts us. Our helplessness before the thousands of needs confronting us at every moment, which we would recognize if we allowed ourselves to be open to the question each one asks of us, keeps us from taking in the world through our breath.

Nor can I allow myself to breathe out into the world, to invest myself more fully into it. It is safer to keep myself shut inside my skin, neither breathing in too deeply nor giving out more than the little bit of breath that enables me to replace what my physical body requires simply to go on existing.

In contrast, 'surprised by joy', I can find myself taken unawares by the beauty of a sunset or a rose. I lean close to breathe in its perfume. I take it deep into myself, almost breathing it down into my fingertips, into my toes, till all my extremities are permeated by the inmost essence of rose.

Then, because I cannot breathe in indefinitely, I breathe out just as deeply and find my breath changed. Something happens to it on the way out as it passes from my toes, all the way through me, something in me responds, names my experience, and gives back an answer, 'Ah! how beautiful! look! come and smell!' My breath is impregnated with sounds, with words, perhaps with poetry. The rose inspires me. I do not have to think how much breath do I need to take in in order to exclaim 'Ah!'. The rose opens my soul in wonder, 'Ah!', requires to be uttered and it of itself takes hold of the breath that it needs. And the receiving of the experience in my inbreath will equal the giving back to the world in my outbreath, impregnated with meaning, with the naming of that experience.

So it is with the immediacy of those experiences which we are still able and willing to respond to. Or it may be the willingness to open and receive the pain of another quite different event: to breathe it in, taste its fullness and then with my human deed to name it and give it back to the wider universe consciously. This pain too will take just the amount of breath it requires if only I do not resist it, but say 'yes' to its need to be experienced, to be breathed in, to be articulated, to be breathed out.

What is it when I breathe in? That substance of the cosmos which is outside the boundary of my skin, I take within myself. And when I breathe out I unite that which I have made my own substance with the universe outside me. Breath is the bridge by which the separation between 'I' and the world can be healed.

Can I form any picture of this substance of breath which physically can be analysed into various gases, and which physically is needed for my survival?

In sleep and in breath I also escape the confines of the physical body. There too I expand into the greater cosmos where consciousness alone determines realities and their relationships. There, in the space beyond physical bodies, I can be one with the creative being of all those realities to which my consciousness extends. Space is filled with the potentialities of the as yet unmanifested. The space is the air I breathe.

To be in a physical body means to have chosen to be not everywhere, but somewhere in particular. To breathe in means to take in that other which I have chosen not to embody. I may choose and according to what I allow myself to be conscious of I can take in this or that. It may be a rose or a sunset or a dying dog. It may be a thought or a picture or a line of poetry; all

wishing from the realm of the unborn, to be breathed in, to be articulated, to be made manifest. I do not breathe them in. They breathe in me.

The shallow intellect which is afraid of realities, and so holds them at a distance, does not require breath. A modern actor is asked to work towards the ideal of speaking 10 lines of Shakespeare on one breath. We can speak without form and shape, with our breath no more than keeping us alive while we mumble our dry utterances which do not breathe in us or through us, but have merely been deflected off the surface of us.

If however, a whole sentence were to take hold of us, the thought permeated by feeling and actively grasped by the will, if from beginning to end we could see the movement and direction of its unfolding, then it could breathe rightly through us, phrase upon phrase taking hold of us within the form, permeating us as far as fingertips and toes, and we could go with it, and reveal what the air is full of: The Thoughts of Gods.

I can go a further step in hallowing of my breath through speech; a step which perhaps has enormous consequences in our troubled time, with the recent nuclear disaster so present in our consciousness. As speaker I can take on the task of cultivating a conscious relationship, first to the sounds of our earthly speech, and then through deeper and deeper penetration, to the beings of the stars and planets whose creative life finds utterance in those unheard sounds whose forces have shaped the created universe. I can begin to attune myself (intonation) and to use my breath in such a way that it becomes a vessel for these spiritual beings to enter our space.

This space, this air, permeated as it is with the etheric body of the Christ, the Word who wants to manifest in our time, could be filled with another radiation than the one we fear. The destruction of matter has released forces we do not understand. The stars and planets wait to be called in to irradiate our space, our air, with their pure astral being, bringing we know not what forces of healing to our planet.

THE BIRD AND THE POEM

Robin Cook

It is not for nothing birds have attracted poets both as metaphors and as subjects in themselves. Birds have a kinship with the element of air which poetry clearly shares. A poem which has not been read aloud has only been half enjoyed and the poet relies upon the sounds carried upon the air to convey his meaning, just as the musician and singer do. Something is created every time sounds are uttered and the magical effect words can have is sometimes blurred, lost or forgotten amid the welter of noise in which many of us live. Words capture, captivate, encapsulate, release, remind, reduce, to tears perhaps, sometimes by their utter simplicity:

‘Put out the light, and then put out the light’

All analysis falls short in trying to explain the complexity of emotion which Othello's words arouse in us. The words wing their way to us and weave a subtle magic. This element of air, so important in such a process, is that inhabited by birds and their song and many poets have sensed that bird song is a creative process made manifest. The thrush on the ‘blossomed pear-tree’ cannot but sing; in a sense he is his song.

However, birds have been used in many different ways and often in much less familiar settings than Browning's. In noticing the use that has been made of them we can also trace the evolution of man's changing relationship with his environment.

In common with the birds of Homer, Old English poetry often uses them in connection with sorrow or death, noticeably in the plangent cries of the sea-birds in ‘The Wanderer’. A bird which commonly appears is the raven, which, in Germanic literature, was associated with Wodin. It could have ominous consequences if it appeared on the battlefield, but, in a different situation could have a positive meaning. The Anglo-Saxon mind did not make our sometimes rather facile distinctions between good and evil and saw natural and supernatural forces as being sometimes one and sometimes the other, depending on circumstances. There is the strong suggestion too, that the raven was not regarded as a symbol of something else, but rather as an objective reality – as real as the battle taking place beneath its gaze.

It is only with the flourishing of the intellectual distinctions in the mediaeval mind that one finds birds being used to symbolise various aspects

of the human state and, indeed, being humanised – i.e. they are judged by moral standards and characterised by human traits, as in the false cuckoo and the pious pelican. The best example is, perhaps, the hawk family, which was ranged into a hierarchy reflecting the strata of human society. The eagle was for the emperor, hawks for those of noble birth and so on down to the buzzard and kite which could not be trained and symbolised all things base. Chaucer, in the *Parlement of Foules*, used the eagles to expound on courtly love, and in the *Squire's Tale* the noble lovers are a pair of peregrines. Another characteristic device is talking birds which debate, sing services and preach – however here one really sees a human with a bird mask and Chaucer obtains humorous effects, notably in the *Nun's Priest's Tale*, when he switches without apology or preparation from describing Chauncleer and his appearance and crowing habits, to a lengthy discussion on dreams and their meaning and back to Chauncleer strutting around the yard. However, the common denominator in mediaeval bird poetry is symbolism and much of the time they are depicted in those dream gardens where it is always May, flowers bloom, water flows and the birds participate in a heavenly harmony which is not meant to be realistic. The symbolism is often deeply religious as we see in Lydgate's ‘Devotion of the Fowls’ where it is the pelican which grieves over Christ's suffering because she is the symbol of resurrection; because, as the bird of spring, she is associated with renewal.

The Elizabethans concentrated on birds as singers par excellence but we now become more aware of the reader being the listener. The landscapes are more familiar and it was then that the nightingale established its pre-eminence as a subject for poetry. This bird was all music and emotion, presiding over lovers and Love and often named Philomela. The origin of this is the rather gruesome Greek myth in which the Thracian King Tereus married a maiden named Procne and raped her sister, Philomela, cutting her tongue out afterwards so she could not tell of the deed. Philomela then wove the story into a tapestry which she sent to Procne. Procne killed her son and served him up for Tereus to eat and as she announced what she had done Philomela came in carrying the child's head. At this point the gods changed them all into birds, Procne becoming a nightingale and Philomela a swallow. However, in the Latin version used by the Elizabethan poets, it was the other way around. Normally the Tereus-Philomela part only was used in poetry, and soon the rape became more impetuous ardour than savage violence. The nightingale came to symbolise the full range of passion, to be a distillation and transcendence of a magical experience, but, of course, a human experience.

As the 17th century continues, we can see in the work of Marvell not only the characteristics of Elizabethan poetry, but also realistic glimpses of birds he has watched himself. He gives the feeling that he has really looked at birds and shaped what he has seen with his poetic vision. Marvell, of course, uses birds for highly complex effects, but the realism he introduced hinted at

what was to come in the 18th century, where correctness, amongst other things, was admired and expected. A product of the general enthusiasm for science was Thomson's poem *The Seasons*, in which bird habits are described and treated as things apart, to be noticed and examined, rather than accessories to human affairs.

Poetry of the 19th century is diverse, objective and subjective, literal and imaginative, ranging from Coleridge's albatross to Clare's examination of bird habits, to Keats's self-examination in the *Ode to the Nightingale*. To a realist the object is an end in itself, but to the Romantic poets it was more a door to their own experience. It has been suggested of Shelley's 'To a Skylark' that 'Shelley sang a better song to the lark than the lark sang to Shelley'. (S. Piatt, *A Word with a Skylark*). Indeed Shelley does not really tell us much about the skylark but rather writes an ecstatic reaction to the song which is itself a song. Similarly, Keats tells us little about the nightingale, but his reaction to it is so tensely charged, so impassioned, that we feel we have the essence of the song. Most important, however, is our sensation too and that we realise this is how we ourselves react. We take part in Keats' experience, yet it is also our experience. Similarly, Clare's 'ornithological' poetry makes facts an integral part of the experience, so while the effect seems to be the opposite of what Shelley and Keats were doing, the process of identification is a similar one. Clare searched out nests and met birds where Wordsworth chanced upon them or never saw them at all. The cuckoo was a bird Wordsworth 'recollected in tranquillity'; Clare communicates the vividness of his own experience and claims the experience as truth. Wordsworth's approach was a more contemplative and philosophical one, but qualitatively similar.

Victorian poetry takes the middle ground and while there is more focus on the bird than the poet, there is less ornithological detail. The more conventional birds are chosen as subjects but are often treated with striking originality. New sense is made of old subjects and in Arnold's 'Philomela' he goes back to the Greek version as the mourning nightingale, (lamenting the dead child) and the twittering swallow (she tries to tell the story) make better sense. Bridges writes an imaginative poem of the nightingale arriving from Africa and Tennyson's 'In the Garden at Swainston' uses the bird as a contrast with the grief that is felt in the house for the dead friend. Thus the Victorian poets developed personal styles and genres which appealed to their particular temperaments.

In conclusion it might be useful to compare the treatment of the same object over a period of time and the lark could be regarded as a subject which has consistently attracted attention and one which we can easily relate to today. William Dunbar, who lived from c. 1460 to c. 1520 describes the bird in his poem 'The Golden Targe' as 'heaven's minsterel fine' and its singing as 'angel-like'. The lark is taken as part of the dawn chorus and they sing in surroundings reminiscent of an illuminated manuscript.

'Within their curtains green, into their bow'ris
Apparelled white and red with bloomes sweet;
Enameled was the field with all colouris
The pearly droppis shake in silver show'ris.

The lark forms part of a detailed, colourful and paradisaical scene in which he is regarded as the harbinger of the new day, and though Dunbar mentions,

'The skies rang for shouting of the larkis',

we are only really aware of this as part of a colourful background of

'The purple heaven, o'er sealed in silver sloppis.'

By contrast Shelley concentrates exclusively on the bird and every image contributes in some way to characterising it, or rather its song. The whole poem is an attempt to reproduce the essence of the joy which Shelley hears in the song. Unlike his poetry, the bird's art is 'unpremeditated' and ordinary perceptions become useless as the bird soars higher and 'we feel that it is there' rather than actually see it. For the Romantic poets aspects of nature were often used to illuminate or act as a vehicle for some part of their philosophy and the lark is no exception. It is

'Like a poet hidden
In the light of thought
Singing hymns unbidden
Till the world is wrought
To sympathy with hopes and fears it heeded not.'

This gives us a potent insight into Shelley's concept of the creative process and the lark as a living embodiment of it. Shelley expands on this notion in other verses but later draws it back to his personal experiences in:

'Thou lovest; but ne'er knew love's sad satiety'

and we are invited to feel another kind of yearning. Shelley elaborates in a very personal way but concludes with a tribute which returns us to the notion of the spell-binding powers of the act of creation whether in nature or man:

Teach me half the gladness
That thy brain must know.
Such harmonious madness
From my lips would flow
The world should listen then, as I am listening now.

It could be almost a relief to turn from Shelley's intellectual brilliance to the humbler but equally satisfying skills of John Clare. He writes of 'The Lark's Nest'. He has no interest in using the lark as a metaphor or a revelation – for him the experience is all. The poem needs to be quoted in

full:

From yon black clump of wheat that grows
More rank and higher than the rest,
A lark – I marked her as she rose –
At early morning left her nest.
Her eggs were four of dusky hue,
Blotched brown as is the very ground,
With tinges of a purply hue
The larger ends encircling round.
Behind a clod how snug the nest
Is in a horse's footing fixed!
Of twitch and stubbles roughly dressed,
With roots and horsehair intermixed.
The wheat surrounds it like a bower,
And like to thatch each bowing blade
Throws off the frequent falling shower
– And here's an egg this morning laid!

The poem more or less defies analysis and its simplicity is its most powerful effect.

By the time we get to Thomas Hardy and his poem 'Shelley's Skylark' we can only feel with him the regret that inspiration is so much more difficult to find. Admittedly Hardy is noted for his melancholia, but even so we can see here something shared by many Victorians – the sense of loss. The desire is there, the skill, the knowledge, in many a belief, but somehow the shell is empty. It is not for nothing that Hardy dwells on the death of Shelley's lark:

'A pinch of unseen, unguarded dust'
There is a certain weariness about:
'Lived its meek life; then one day, fell –
A little ball of feather and bone;
And how it perished, when piped farewell,
And where it wastes, are like unknown.'

One feels the 20th century cry of: 'What's it all for?' and Hardy, in 20th century fashion, gives us little comfort. 'Go find it, faeries', he says, with a certain lack of conviction, so that we can preserve that which 'inspired a bard to win Ecstatic heights in thought and rhyme'.

The 20th century has been a masterful preserver and analyser of literature, and many are happy to dwell in the certainties of the past. There is only occasionally the genius which

'(Like to the lark at break of day arising
from sullen earth) sings hymns at heaven's gate.'

WOODWIND IN MUSIC

Julian Pook

The woodwind instruments with which we are familiar today make up a section in the modern symphony orchestra. They are played as a group, and yet of all the sections they are the most soloistic. Solo melodic passages are often given to a flute, or an oboe or clarinet, or a bassoon in its middle to higher register, and the markedly distinct, personal tone quality of each instrument colours the whole ensemble. This is possible for a brass instrument, too – especially the french horn – but the most characteristic contribution of the brass lies not so much in their melodic capabilities as in their exciting and awakening tone, whether singly or together. With the string instruments, where up to sixteen players can be playing a single part, it is the warmth and harmony of their concerted sound that touches us most.

It may surprise many people to learn that our modern woodwind instruments are of comparatively recent origin. The oboe was the creation of musicians at the court of Louis XIV of France, and was first heard in the royal bands shortly before 1660. It replaced the shawn, a strong sounding double-reed instrument most suited to playing out of doors. The oboe had a more refined and flexible tone and, although played outdoors as well, was used for occasions inside the palace. The bassoon also came from the same workshops of Jean Hotteterre, and was a remodelling of an earlier single-piece instrument called the curtal. It was conceived as a kind of bass oboe, and two of the 'Twelve Oboes of the King' were bassoons. The bassoon, however, has a quite distinct tone and, in the eighteenth century, became a solo instrument preferred to the 'cello.

The flute, which goes back to time immemorial, also became more prominent during the seventeenth century. Until then, the recorder had been more important. But since a little before 1600, musical style had undergone great changes, and a new kind of expressiveness and variety of nuance was required from the instruments. The recorder, with its unchanging, organ-like quality, could not do this as well as the flute. The flutist, through changing his lip and mouth positions, could play louder or softer and grade the tone, which a recorder could not. And so the flute superseded it.

The clarinet came a little later, about 1700, and was made by Johann Christoph Denner in Nuremberg. One could say that it was a remodelling of the simple reed pipe. Instead of a free-beating single reed cut out of the tube but not separated from it, the clarinet reed is separate which, when fixed to the mouthpiece, enables the player fully to control it with his lips.



Pan making music with shepherds
Ivory carving by Christof Angermair (17th Century). The instruments (clockwise from top left) are: cornett, rackett, sackbut, small recorder, panpipes, large recorder. (Bayrisches Nationalmuseum, Munich).

It is this fact – that all four members of the woodwind family are fully lip-controlled instruments – which gives them their ability to be so personally expressive. Each of these instruments has a tone quality so distinctive in itself, it is as though we are listening to four completely different individualities.

In the fifteenth and sixteenth centuries, the situation was different. An almost bewildering number of woodwind instruments came into being in this period, most of which became obsolete by the seventeenth century. Invention was most prolific with double-reed instruments. They were made to be played in sets or consorts, so that one instrument would be made in a number of sizes, from soprano to great bass. There were two main kinds – those requiring at least a certain amount of lip control with an uncovered or partially uncovered reed, and those whose reed was covered by a cap which had a slot through which one blew to set the reed vibrating freely. Again, according to the strength of the sound, an instrument was either 'loud' for outdoor or 'soft' for indoor use. This was a general, although not absolute rule.

Thus, the shawns and curtals (which preceded oboes and bassoons) were 'loud' uncapped instruments. The sordun was a 'soft' uncapped instrument with a double bore and U-bend like the bassoon and curtal. The extreme of invention was to be seen in the rackett, which was a 'soft' uncapped instrument with *nine* bores. This meant that the smallest size, the tenor, was four and a half inches long and that the largest, the great bass, was just over one foot. Yet the latter could play as low as today's double bassoon!

Of the reed-cap instruments, the rauschpfeif was 'loud' and was really a capped shawn. The kortholt was 'soft' with a double bore and hence a capped sordun. The crumhorn with its curved end, although stronger in sound, was also a 'soft' capped instrument.

For the sake of clarity I have simplified and mentioned the main groups only. Even to specialists it is often a confusing subject, and I am aware that there will be many readers who have not heard of, let alone heard, the instruments which I have mentioned. The point, though, is this: the woodwind instruments of the Renaissance, above all others, brought an unprecedented variety of tone colour into the music. This came in the wake of great changes which occurred soon after 1400. In vocal music of the fifteenth and sixteenth centuries, for example, all the voice parts became equally melodic and significant. In this respect the music becomes freer than before 1400, but there was not yet a hard and fast distinction in style between vocal and instrumental music. Instruments played the same parts, with or without the voices. Even instrumental music as such – for example, dance music – was not written with specific parts for specific instruments. It was played in all sorts of different combinations. And so, in this way, a wonderful variety came about. Musicians as a matter of course each played several instruments, and changed from one to another when required.

Today, when one hears a concert of renaissance music played on modern copies of the original instruments, it is possible to have a feeling of naive joy at the unspoiled freshness and variety of sound, quite unlike the sophisticated sounds of the modern orchestra. Much of this is due to the woodwind, either with their individual tone colour as a consort, or – especially with the bass instruments – lending their tone colour to other instruments.

* * *

All woodwind are one of two kinds – flutes or reeds. The flutes fall into two general categories – cross-blown and end-blown. The reeds also have two main divisions – single reed and double reed.

Cross-blown flutes include pan-pipes, rim-blown flutes and transverse flutes. Pan-pipes comprise a number of tubes without finger holes and closed at one end, bound together like a raft and blown across the open top. Rim-blown flutes have finger holes (enabling one tube to replace the several tubes of the pan-pipe) and are also blown across the top end. The breath strikes a notch on the rim, opposite the lips. Transverse flutes are held to the side and played like the modern flute.

End-blown flutes can be of various kinds, the most familiar to us being the recorder type which has a block placed in the mouthpiece, thus creating a windway for the breath which strikes against an edge a little lower down the tube.

Single-reed pipes are of the clarinet type, which means that one cuts into the tube just below a knot or closed end, creating a ‘flap’ which vibrates freely when blown and held entirely inside the mouth. Double-reed pipes are similarly held inside the mouth, the simplest kinds consisting of an open tube with the end flattened to form two vibrating blades, the more complex having a separate double-bladed reed which can be fixed into the end.

One more instrument can be mentioned which can come into either of the reed pipe categories. Single or double reeds can be used for it, and that is the bagpipes with all its variants.

It now becomes clear, when we consider the fundamental types of woodwind, that we are approaching more closely to their origin shrouded in the mists of time. The materials come directly from Nature and need but little shaping in the hands of man. Their natural place is in a pastoral environment and the natural player a shepherd.

How did the shepherd come to make his pipes? Ancient peoples had their own answers to such a question. The pan-pipes are named after a Nature god, Pan. They also have another name, ‘syrinx’. Pan brought health and fertility to herds and cattle, and was often surrounded and followed by nymphs. One nymph – a naiad of the river – was called Syrinx, and Pan was particularly desirous of her and tried to pursue her. Before he could catch her, *she called upon Zeus for help* and was changed into a reed. From this, Pan made seven pipes and bound them together, henceforth to play

upon Syrinx, his beloved.

Pan taught another god, Olympos, to play upon the syrinx. Olympos taught human beings. In other words, the people who made these instruments must have done so out of an inner imagination or supersensible experience, which was clothed in these pictures of the myth. When they played upon the syrinx, it brought them close to the spirit of Nature. Its very sound awakens a feeling in the soul, as if reminding it of something no longer directly perceptible or attainable. The very spirit of the wind whispers in the tones, consoling yet full of longing, beautiful and yet tinged with sadness.

Alongside the syrinx and the flutes were the reed pipes. These were represented in ancient Greek times pre-eminently by the aulos. The name ‘aulos’ finds its way, unfortunately, into many modern translations as ‘flute’, which is incorrect as the aulos was a reed instrument held in the mouth as described above. On Greek vases it is usually shown double, that is, with two pipes held in the mouth and blown simultaneously. In contrast to the flutes, the aulos came prominently into the town life of Greece, and players competed on it at the Games. In other words, it was cultivated by virtuoso professionals. The sound of the instrument was very exciting and – as Plato and others describe – put people into a frenzy. In fact, it was the instrument of the festivals of Dionysos (Bacchus), god of fertility and wine.

The Greeks tell us that it was one of the satyr-like followers of Dionysos who first played the aulos. His name was Marsyas. He had not created the instrument, however. It was one of the upper gods who had done so – Athene. When she played upon the aulos, she noticed that some of the other gods were trying to conceal their laughter. Later, with the help of seeing her own reflection in a pond, she saw that she did look rather ridiculous with her cheeks puffed out, and so she abandoned the aulos there, which was where Marsyas found it. Its sound was so enrapturing, he enchanted all and sundry, until Apollo got to hear of it. Apollo was the great representative of the string instruments for the Greeks. The lyre and cithara (both plucked) were his instruments, and they accompanied song. Apollo summoned Marsyas to a contest, with the Graces as adjudicators. The Graces were hard put to it to make a decision, since the music of both was so beautiful. Apollo then challenged Marsyas to play his aulos upside down and to sing, which, of course, he could not, it being impossible with a wind instrument. Whereupon Apollo turned his lyre upside down (that made no difference) and played it while he sang. The Graces could not but choose Apollo as the winner. Marsyas was hung on a tree and skinned alive.

We may feel that it was unfair for Marsyas to meet such a fate. But, then, what is ecstasy but being ‘skinned alive’? One’s usual orientation towards the world from ‘within one’s skin’ is lost, in order that another orientation is attained ‘without one’s skin’. The music of the aulos was a part of this process of stirring sensual enjoyment to the point of being ‘killed’ by it,

when one burst the bounds of ordinary consciousness and participated for a short while in a more extended state of being.

Both Plato and Aristotle were cautious in relation to this wildly modulating and ecstatic sounding wind instrument used in the Dionysian dance, and for good reason. It embodied everything that was unpredictable, uncertain, peculiarly personal, unstable. Instead of staying in one musical mode, it could change at will, it seemed to have no law. For us to try to imagine why it was that Plato, especially, was so critical of the aulos, we can, perhaps, find a faint parallel in the differing feelings of our own day about the use of the saxophone and clarinet in jazz. Plato could see something coming into society which he felt would eventually cause it to fall apart. His answer was to suggest a maintaining of the best which had come from the past, including music. And that, for him, was the calm, supra-personal music of Apollo. The very picture of the human being uplifted through singing of the divine accompanied by the chaste sound of the strings, was a picture of man dignified and free and yet held within the laws of the world. In contrast, the picture of the human being swept along and intoxicated by the unpredictable torrents of seductive sound proceeding from an instrument which did not even allow him to be free to express human speech through singing, was a picture of man as a law unto himself yet being in reality bound and in danger of having no law at all.

* * *

In the early Christian centuries, instruments of all kinds were, almost without exception, kept outside the church. Clement of Alexandria, in the second to third centuries, wrote: 'The one instrument of peace, the Word alone by which we honour God, is what we employ . . . no longer . . . the ancient psaltery, the trumpet, the timbrel, and aulos . . .' In the western church, it was only later – certainly by the ninth century – that the organ appeared with the singing, and later still – perhaps in the twelfth century – that instruments were used, also with the voices.

Much is obscure to us now concerning the use of instruments over this long period of time. We cannot say much more than that they continued to be used among the people for all sorts of social occasions, as indeed they had been and have been all over the world.

Although the woodwind came into prominence again in cultural circles of the fifteenth and sixteenth centuries, it is not until the late seventeenth and well on into the eighteenth century that they begin to be a part of instrumental ensembles culminating in the modern orchestra. The music of Apollo, one can say, helped this to happen. The violin had emerged by about 1550 in Italy. To begin with, it was considered mainly as an instrument for dancing, but it came into courtly circles in Italy before the end of the century. The violin family gradually superseded the other bowed strings – the viols – and became the foremost instrument in the seventeenth century, exemplified in the 'Twenty-four Violins of the King' established by Louis

XIII of France in 1626. The violins, with their greater brilliance and tonal expressiveness, almost demanded other such instruments to join them. The woodwind obliged, in the form of the instruments described above at the beginning.

The composers were at hand, too. By the early eighteenth century, many concertos for solo wind instruments and strings were being composed, notably the flute, oboe and bassoon concertos of Antonio Vivaldi. The music of Johann Sebastian Bach contains much rich writing for the woodwind, particularly for the oboe along with its two slightly deeper and mellower family members, the oboe d'amore and the cor anglais. Many an expressive aria from the cantatas, oratorios and Passions has one, two or more of the instruments playing an obbligato part, greatly heightening the feeling of the music. One example is the aria 'I would beside my Lord be watching' from the St Matthew Passion, for tenor solo and chorus, with a single oboe echoing and interspersing the tenor part in a most moving manner. Bach's great contemporary, George Frederick Handel, continued the outdoor tradition of the wind instruments on two notable occasions which produced the Water Music and the Fireworks Music. The former included some strings, but in the original scoring was mainly for wind instruments. The latter was originally written for over a hundred wind instruments, including twenty-four oboes and sixteen bassoons.

In general, however, one can say that the woodwind had come indoors, contributing an expressive inwardness to the music. An outstanding example in the late eighteenth century was the music of Wolfgang Amadeus Mozart. He visited Mannheim in 1778 and heard its famous orchestra, which had included clarinets already for a number of years. He wrote to his father: 'Oh! if only we had clarinetti! You would not believe what a wonderful effect a symphony makes with flutes, oboes and clarinets'. He included clarinets thereafter in his symphonies and wrote a clarinet concerto, a clarinet quintet and a trio for clarinet, viola and piano, all of which show a wide range of musical feeling. He also used clarinets and bassett horns (sensitive, softer toned 'tenor clarinets') for special masonic occasions, as he felt their tone was especially suited to these events of particular solemnity. Of all the music in the repertoire, Mozart's wind quintets and octets, and especially the outstanding Serenade for Thirteen Wind Instruments touch depths of feeling seldom found in wind music elsewhere. Besides the clarinet concerto, are also concertos for flute, for oboe, and for bassoon, all of which are a 'must' in any woodwind player's repertoire. The level at which Mozart uses the woodwind can be experienced in his opera 'The Magic Flute', in the instrument of the flute itself which helps Tamino and Pamina through their initiation trials. For a moment one can be reminded of a spiritual fact recorded far, far back in the East in the Nadu-Bindu Upanishad of the Rig Veda, where it says that in the last stages of meditation one hears inner sounds which are like those of various instruments,

including the flute. In the same opera also, we have a reminder of the music of Nature in the bird catcher Papageno's five-toned pan-flute!

It is one thing to touch something of the spirit of Nature through sound itself, and another to try to imitate, as in 'programme' music. It is easy, for example, to 'imitate' bird sounds with woodwind instruments. The Finnish composer, Jean Sibelius, is reported as saying that 'so far as he was concerned all twittering and cawing noises in music were an abomination, unless treated as in Beethoven's Pastoral Symphony'. In the symphony as a whole, even though it can be said to have a 'programme', Beethoven never oversteps the bounds of the purely musical, so that he gives us a *feeling* of Nature and not a painting. Even though, at the end of the second movement, the flute is the nightingale, the oboe the quail and the clarinet the cuckoo, it all belongs to the essentially *musical* structure of the composition. Here, it is as though Nature were refined and elevated through the musical sound itself.

The ability to think and feel directly in instrumental sound was an especial capacity of Sibelius. He had, in fact, as a child already heard all of the instruments of the orchestra inwardly. He said: 'When I then heard an actual instrument for the first time I recognised it at once, and right from the start we were old friends'. For him there was no need for 'orchestration' of his compositions – 'My music is ready in its instrumental form'. He had no use for new instruments, either: 'I can say everything I want to say with those that are available today. One must only understand how to use them properly'.

One composer who certainly knew how to use instruments properly was Richard Wagner. I will take just two examples, both from his opera 'Tannhäuser'. In the first act, Tannhäuser, a minstrel, has long been dwelling beneath the mountains in the realms of Venus, goddess of love. He longs to return to the upper world again and has to struggle against the charms of his mistress to break free. He finally calls upon the Virgin, and at the sound of the name 'Maria' everything dissolves and he finds himself in the valley of the Wartburg. Up to this point, the music has been both luxuriant and tempestuous, and now, as the orchestral sound dies away we have a perfect transition when a single clarinet emerges with a few phrases, giving the music over to a single cor anglais, which, accompanied by sheep bells, is the shepherd's 'pipe' being 'played' on stage by a shepherd boy, who afterwards sings unaccompanied that 'May is here, the lovely May'. Through the single wind instrument and then the solo voice, we are immediately transposed from the state of oversaturated sensual love to the naive realm of innocence.

The second example comes in the last act. Elisabeth, niece to the landgrave, ever faithful to Tannhäuser, prays in the valley at the shrine of the Virgin for Tannhäuser's salvation. (He has gone to Rome with the pilgrims, and she awaits his return.) Wolfram von Eschenbach finds her there. He has great love for Elisabeth, but from afar. The pilgrims return, their sins

forgiven, but Tannhäuser is not amongst them. Elisabeth sinks to her knees and cries out to the Virgin to let her die that she may intercede for him in heaven. As the accompaniment to this prayer, we hear woodwind instruments only (with a single horn sometimes blended in the ensemble), particularly clarinets in their lower register and a bass clarinet. At the end of the prayer the flutes play slow harmonies higher up, and, together with the clarinets, we have musical sounds of sublime purity and longing, as though echoing Elisabeth's highest feelings. The cellos enter briefly, and Wolfram asks if he may accompany her. She greatly gestures her refusal and slowly leaves, all the while the woodwind playing in an ensemble of touching beauty and yet completely stilling the listener's soul as it hears these sounds which seem literally to bear it heavenward. As she disappears, the flutes three times soar higher and higher while we hear three arpeggios from the harp as Wolfram takes up his lyre to sing to the evening star. He asks the star to give her his greeting as she passes it by on the way to becoming an angel beyond.

In this music, all the personal soul qualities of the woodwind are lifted up. They no longer express only the personal soul itself, but sublimate themselves so that the spirit shines through. The air which we breathe in for our own personal existence is given back again in the tones of the woodwind, which transcend themselves and offer themselves to the divine.

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BIRDS IN FLIGHT

Mark Riegner

It was a common sight in the bustling marketplaces of 15th Century Florence to see displayed for sale a variety of caged songbirds. The incarceration of these feathered creatures attracted the attention of one young man who would purchase the captives, remove them from their prisons, and release them into the air, making careful, detailed observations of the positions and gestures assumed during their flight to freedom. Such observations engaged the thirty-year old Leonardo da Vinci in a study of bird flight that was to occupy his thinking for the remainder of his life. In his 'Codex on the Flight of Birds', Leonardo presented a vivid account of the mechanics of avian flight and its application to the design of human flying machines. Like much of his scientific research, Leonardo's study of flight anticipated the thinking of later centuries, and today many of his conclusions remain in agreement with our present understanding of this subject.

A fascination with bird flight was not, however, unique to Leonardo. Since times earlier than his up to the present, people have looked to the sky with wonder and admiration, and even with envy, at the graceful flight of birds. Who among us has never been inspired by the sight of a flock of geese travelling in V-formation across a blazing, orange sky at dusk, or by a glimpse of a lone kestrel poised in midair above a wheat field? No other natural phenomenon, apart from cloud formation, expresses the complexities and subtleties of aerial movement as does bird flight. Swaying branches, drifting clouds, floating seeds and foaming whitecaps are limited to relatively simple motions caused by winds acting upon them. Birds, in contrast, can not only give themselves over to very tenuous atmospheric currents, but they seem to have incorporated into themselves the dynamic qualities of the air, and can bring these to visible expression in the gestures of their flight.

The bird's relationship to air is observed not only externally in its motion, but can be seen also internally in its anatomy. Unlike mammals, whose bones have a solid marrow, the avian skeleton is composed of thin, hollow, air-filled bones. Air spaces occur even in the skulls of most birds. (An interesting exception, where cranial air spaces are lacking, is the kiwi, a flightless New Zealand bird that has 'relinquished' its intimate relationship to the air.) Internal cross-struts provide strength and support to these thin bones. Although the hollowness of avian bones is clearly a weight-reducing

feature, it can also be seen as a manifestation of the airy element into the innermost core of the bird's material body.

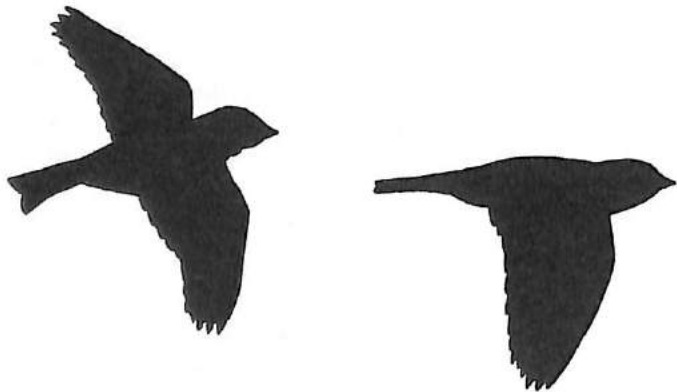
A further anatomical feature that permits an extensive penetration of air into the avian body is the presence of voluminous air sacs. Again in comparison with mammals, birds have relatively small lungs through which surprisingly little gaseous exchange occurs. The main respiratory function is achieved in the air sacs, which arise from the lungs. These membranous pouches extend throughout the body cavity, and when inflated, occupy an average of fifteen percent of the total body volume. Small birds, such as house sparrows, may have six or seven air sacs while larger, strong fliers, such as storks, may have twelve to fourteen. Besides surrounding the major organs, pockets of these air sacs often project directly into the hollow chambers of the bones. Thus, not only do birds fill the surrounding air with their movement, but the path of air through the bird is no less impressive.

Although there are so-called flying fishes, squirrels, frogs and even snakes, no other vertebrates, bats included, are able to match the elegance of bird flight. The external anatomical structures which make avian flight possible are, of course, feathers and wings. The wing form varies considerably among different groups of birds, and corresponds to the quality of their flight. Feathers, in contrast, show little variation among species. The flight, or contour, feathers are composed of a central, hollow shaft surrounded by a planar vane, which has filaments with interlocking hooklets. If one finds a contour feather on the ground, and the vane has separations, one needs simply to run one's fingers upwards along the vane to 'zipper up' the gaps by allowing the microscopic hooklets to interlock. This is what birds accomplish with their beaks when preening. The rigid, yet flexible, quality of contour feathers allows for a highly streamlined body, so important for efficient aerodynamics; and, being 'as light as a feather', the entire plumage accounts for only about six percent of the body weight.

The wings of birds are remarkable appendages that lift, propel and guide the creature through the air. A comparison of the skeletal forelimbs of humans and birds shows a proportionate reduction in the upper arm and elongation in the 'hand' bones (though with a reduced number of digits) in the avian skeleton, illustrating how the bird is drawn out towards the periphery. The primary contour feathers are attached to the hand, the secondaries to the arm (ulna). During a downstroke, the primaries propel the bird forward while the secondaries produce lift. The upper surface of a wing is typically cambered, that is, convex. As the wing carves through the air, air flowing over the upper, longer surface must travel faster than air flowing beneath the lower, shorter surface; therefore, the air pressure is weaker above the wing. This pressure differential generates lift. To demonstrate this phenomenon, you can hold a sheet of paper at adjacent corners with the sheet's edge touching just below your lower lip. Blow downwards across the upper surface; the air pressure above the sheet will be

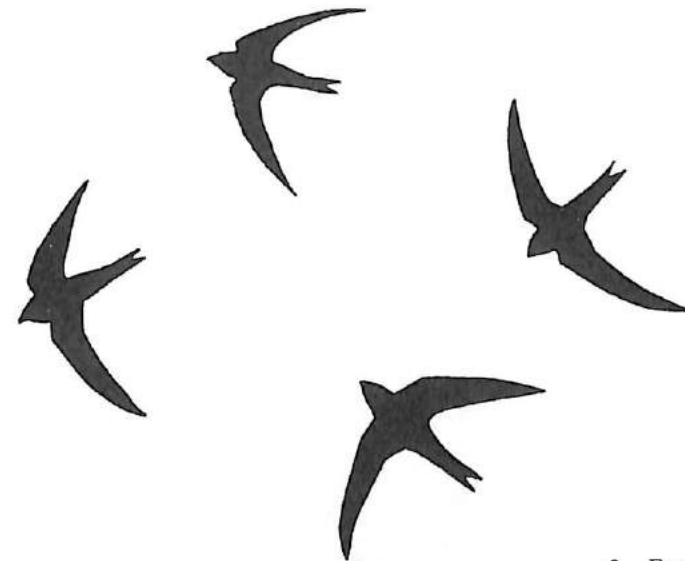
reduced and the paper will rise. A thorough discussion of the mechanics and aerodynamics of bird flight would lead us well beyond the scope of this article; interested readers should refer to a general ornithology text. As any honest textbook will state, however, our knowledge of bird flight remains incomplete with many puzzling questions.

From even a casual observation of birds in flight, it is evident that the quality of flight varies among species. The rapid flapping wings of a robin darting amongst the underbrush, the swooping loops of a swift, the motionless wings of an eagle soaring high in the sky, the struggle of a gull against an offshore wind, each bespeaks a different relationship to the air. In fact, we may consider that each group of birds brings to expression a different quality of the air, which is not only observed in the bird's motion through that medium, but is also reflected in its morphology, especially that of the wings. Ornithologists identify four basic kinds of wing related to different patterns of flight, although intermediate wing forms are also recognised. Common garden birds, such as robins, blackbirds, chaffinches, wrens and blue tits, need wings that enable them to manoeuvre through dense vegetation in forested or shrubby habitats where the air is generally still. These birds typically perform short, relatively slow flights with much wing flapping, and with many quick turns and abrupt stops. Such birds have so-called *elliptical* wings, which are broad, short and highly cambered. The wing edge is often 'slotted' by the slightly separated tips of primaries; each projecting feather tip behaves like a miniature wing as air flows above and beneath it, and thereby a high degree of flight agility is achieved. Birds with elliptical wings can take flight, swerve, or come to rest in an instant.



1. chaffinches

Birds that fly at great speeds for hunting or for long distance migrations have characteristically long, narrow, sweptback wings that taper to a point. These *high-speed* wings resemble a sickle in form and have little camber and no slotting. Birds with this type of wing are considered by some to be the masters of the air, and include swifts, swallows, falcons and terns. Swifts, for instance, have such a strong connection to the air that their legs and feet, the limbs that would otherwise relate them to the earth, are tiny, almost useless, appendages. Swifts rarely, if ever, alight on the ground. Their diet consists of insects captured in flight, and they even drink, sleep and mate on the wing. Their swirling, dipping, looping aerial gestures complement the quiet, still surfaces of lakes above which they often feed. Estimates of their flight speed have ranged from 150 to 180 miles per hour and upwards, and a European swift was once estimated to fly a total of about 550 miles in one day in search of insects to feed three nestlings.



2. European swifts

Another of the fastest of birds is reputedly the peregrine falcon. Peregrines favour perches high on cliffs from which they survey the air below for likely prey, such as pigeons. When a potential meal is sighted, the falcon takes to the air by diving downwards, holding its wings against its body, and may reach an estimated velocity of over 200 miles per hour. A peregrine will often plummet to an altitude below that of its target, and then, just before colliding with the treetops, the bird will flick out its wing tips and swoop upwards towards its quarry from behind. Seen from a distance, a sudden cloud of feathers indicates a successful strike.

Another group of birds with high-speed wings is the terns, which includes the world's champion long-distance migrant: the Arctic tern. This tern breeds in the high Arctic during the spring and begins its migration to the edge of the Antarctic icepacks during the late summer; it reaches its destination in time for the southern summer. Not only does the Arctic tern hold the record for travelling the greatest migratory distance of any bird – 25,000 miles roundtrip annually – but in so doing, it experiences more hours of sunlight than any other animal.

Terrestrial soaring birds possess the third type of wing, which is long, broad and highly cambered, and whose primary feather tips project like fingers. These wings, aptly called *slotted*, *high-lift* wings, are typical of eagles, hawks, vultures and storks. When soaring, these birds bring to expression the invisible movements of air. As areas of the earth warm up in the morning, great masses of air begin to rise and circulate. These convection currents, or thermals, can be in the form of magnificent vertical pillars or immense bubbles. Relying on an uncanny sensitivity to the subtlest air motions, an eagle, for example, will search for these ascending atmospheric currents. Upon meeting a thermal, the bird spreads its wings, fans out its wing tips, and climbs in a slow, lazy spiral. In so doing, the air currents are made visible to our eyes. If an eagle is flying a long distance, it

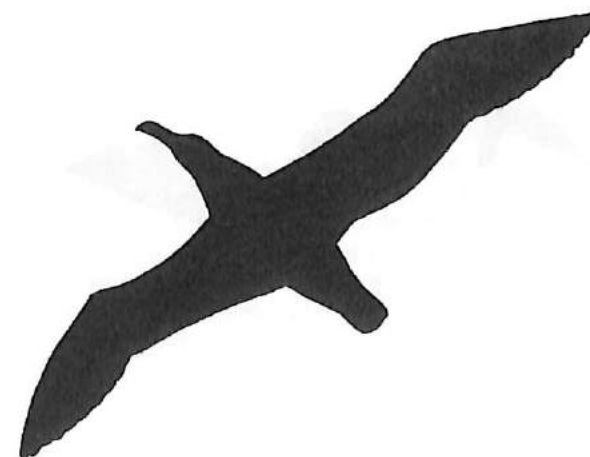


3. golden eagle

may rise on a thermal, then depart from the ascending air mass, and glide diagonally downwards across the land until it encounters the next thermal. A bird may soar great distances in this way with hardly a flap of the wings. Vultures, for instance, can spend all day effortlessly circling high above the African plains, scanning the ground for carrion. (Although the slotted, high-lift wing provides efficient lift for such large soaring birds, a gorged vulture may remain grounded until its meal is digested and eliminated!) Besides riding thermals, terrestrial soarers can take advantage of updraughts caused by prevailing winds striking and being deflected upwards by obstacles, such as hills, cliffs and buildings. Here, again, these birds make visible an invisible aerial activity.

Owls, too, have slotted, high-lift wings, but because they are nocturnal, no thermals are available to them and thus they do not soar. Owl wings have a unique feature in that the contour feather margins are fringed and fluffy to muffle the sound of the wings slicing through the air; this produces a silent flight that enables owls to approach their small rodent prey undetected. Interestingly, the Asian fishing owl, which feeds on submerged animals, lacks this feather modification.

The fourth kind of wing is found in oceanic soaring birds, such as albatrosses, frigatebirds, gannets, petrels and shearwaters. Their wings are very long and narrow, and usually lack slotting, but are not swept back like the high-speed wing. These are called *high-aspect-ratio* wings, which refers to the proportion of wing length to wing breadth. Because rising thermals are generally absent above water bodies, oceanic birds must employ another

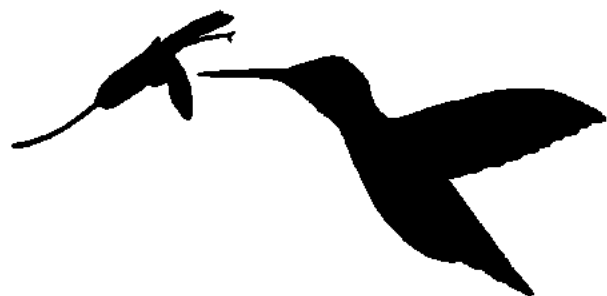


4. wandering albatross

method of soaring. Steady winds blowing across vast areas of the world's oceans provide an advantageous source of energy to the birds that live in these pelagic environments. When a wind meets the water's surface, its speed is lowered due to friction. Thus, wind speed is lowest just at the water's surface, and increases at higher altitudes. An albatross, for instance, will fly head-on into a wind at low altitude and rise against it; then, when a high elevation is attained, the bird will turn and soar with the wind at considerable speed for great distances. Because many species of albatross use this method of dynamic soaring almost exclusively, they are limited in their global distribution to those oceanic regions in which strong, prevailing winds occur, such as the 'roaring forties'.

The frigatebird, another oceanic soarer, exhibits an additional phenomenon associated with air. As part of their courtship display, males inflate a voluminous, brilliant scarlet throat pouch to entice females. The inflated sac is almost as large as the bird's body. So in the frigatebird, we see not only a gesture of movement within the air, but also a gesture produced by air within the bird.

No description of avian flight would be complete without mention of those birds that demonstrate a unique kind of flight: the hummingbirds. This family of about 320 species, which includes the tiniest of all feathered creatures, is distributed in the Americas. Hummingbirds are the only birds capable of hovering in motionless air. This ability is necessary in order for them to position themselves at the openings of flower corollas from which they suck liquid nectar. Besides remaining stationary in a fixed spatial orientation, hummingbirds can fly up, down, left, right, backwards or forwards. When hovering, the hummingbird's wings (which are of the high-



5. rufous humming bird

speed type) describe a figure-eight in the air, beating on average forty times per second (compare with three beats per second for doves, one beat per second for vultures). The hand bones of their forelimbs are considerably elongated relative to the upper arm bones, indicating anatomically that hummingbirds are highly extended peripherally into the surrounding air space. Their feet, like those of swifts, are minute appendages used only for perching. Hummingbirds, we may consider, are truly creatures of the air with little connection to the solid earth; not even their food is solid. With buzzing wings, these aerial acrobats typically fly in circuitous paths through dense forest growth, expressing a living movement in the still, humid air.

The bird, as has been repeatedly indicated, can be seen as a creature extended peripherally. In fact, we can imagine that the bird's consciousness is not centered in the animal's body, but exists in the surrounding spatial expanses. The keen senses of birds are indicative of how their awareness is directed outwards to the world around them. Consider how a hawk, soaring high above the earth, is able to detect a small mouse scurrying through a field, how a gliding stork can distinguish subtle movements of circulating air, or how a warbler can migrate from Britain to Africa and then back again the following spring. In fact, it has been demonstrated that birds can navigate by sensing the earth's magnetic field, and by orientating to the positions of the encircling stars. The element in which the avian consciousness comes to full expression is, of course, the air. When we observe a bird's flight, it is perhaps instructive to imagine that the flight pattern, the form of movement in its totality, is a signature in the air of that bird's particular quality of consciousness. The wide, gentle spirals of an eagle, the undulating, rhythmic flight of a woodpecker, the swooping curves of a swallow, all reflect qualities of consciousness. In fact, we can consider that the bird's consciousness dwells *in* the aerial movement into which the material body is drawn. This thought is consistent with Rudolf Steiner's observation that the bird experiences its corporality as an encumbrance from which it desires to be freed (*Man as Symphony of the Creative Word*). The being of each species of bird lives in the aerial movement typical for that species, a movement that is made visible to our eyes by the material body of the bird. Here we can find a correspondence to the art of eurythmy, introduced by Steiner in the beginning of this century. Eurythmy provides the possibility for human beings, working consciously with imagination and movement, to enter into the living qualities of music and of speech, and to bring these to visible expression with their limbs. Perhaps we can consider that birds, being at one with their environment, quite naturally move in accordance with the atmospheric forms created by a kind of living breath of the earth. In both eurythmy and avian flight, something invisible is made manifest to our perception.

The beautiful, harmonious flight patterns of birds – loops, swirls, spirals,

lemniscates – suggest a living quality of aerial motion. Even in the flapping flight of our common garden birds, we see not a mechanical, measured activity, but a life-filled, rhythmic beating of wings, which differs for all species. Moreover, scientists in England have recently shown with sophisticated cinematography that in flight each downstroke produces a vortex ring in the bird's wake, and that the wing tips of a gliding bird create a continuous, meandering vortex ribbon. These forms, which are characteristically associated with living processes in fluid mediums, can come to life in our imaginations as we observe birds in flight.

Few sights in nature are as spectacular, or as puzzling, as a great flock of birds moving across the distant sky like a cloud of smoke wafting through the atmosphere. In a remarkable feat of coordinated movement, individual flock members can turn in perfect harmony, and thus the flock appears to move as a single organism. Biologists are at a loss to explain how the flock members can presumably communicate to each other instantaneously to allow for such coordinated movements. Anthroposophy, however, can shed light on this phenomenon, for here we surely have a vivid example of the workings of the animal group ego, described by Steiner in many lecture cycles (e.g. *Universe, Earth and Man*). Unlike the human condition, in which our egos are individualised, each animal species has a collective ego, which reaches out to all the members of that species. Steiner explains that if we poke our fingers through a sheet, the fingers are analogous to individual lions, while the remainder of our hand, which is not visible, corresponds to the lion group ego, which is in communication with each lion. Returning to our flock of birds, we can perhaps imagine that just as my ego can communicate to the five fingers of my left hand simultaneously, so can the group ego communicate simultaneously with each member of a flock of birds. Consequently, the flock can behave as an individual superorganism (which, in a sense, it is), and we can apprehend the signature of the group ego made visible by the motion of the flock.

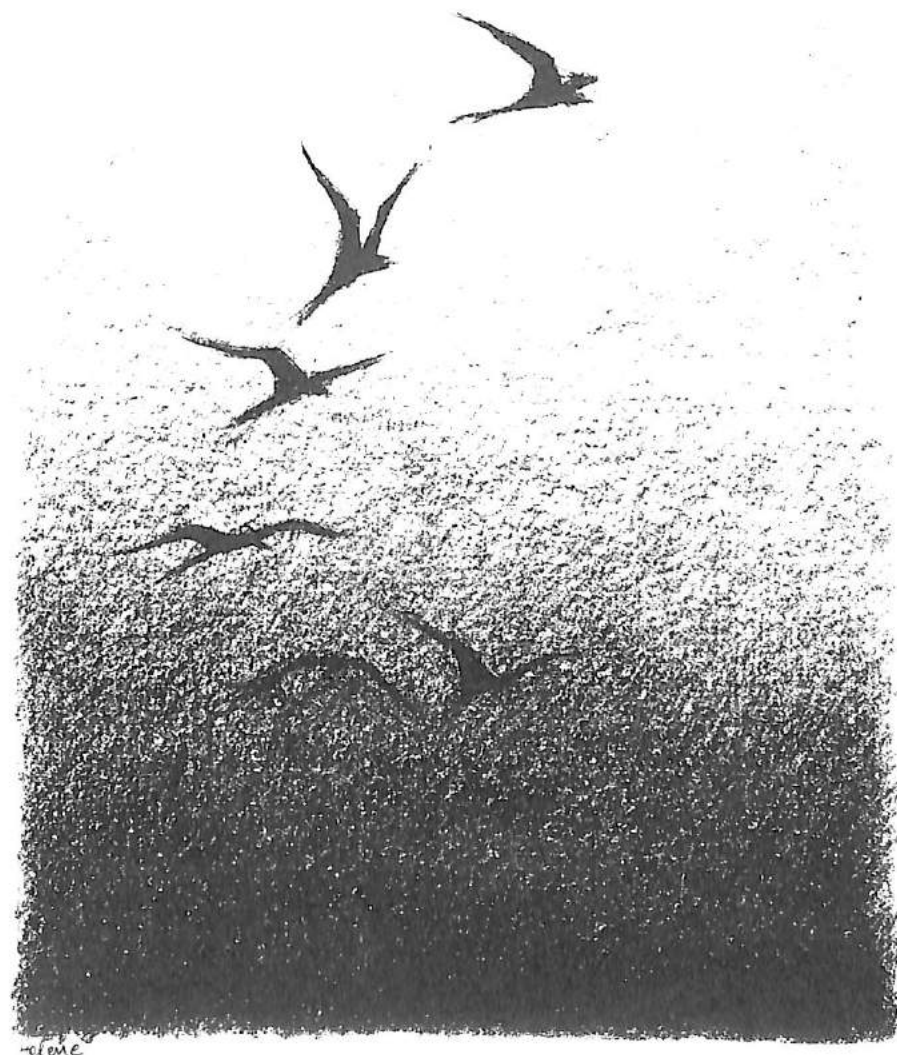
One further point on flock behaviour that warrants mention is in regard to the extraordinary flight formations adopted by some species. Certain geese, for example, fly in a 'V' formation with the apex leading. Studies have shown that the energy expended per bird is lower in such a formation than if the bird were flying alone. By flying in formation, an aerial wave is generated by the birds' wings, and travels across the sky with the flock. By each bird flapping its wings rhythmically in phase with that part of the wave with which it has momentary contact, the wave is strengthened and, in turn, each bird is assisted by the energy of the wave. In fact, the rhythmic movements of the aerial wave travel forwards as well as backwards so that the leading birds benefit from the efforts of those birds behind them, and vice versa. Flight formation, therefore, should be regarded as an organic totality, with the parts serving the whole, and the whole serving the parts. (for a more thorough discussion of this phenomenon, readers should consult

T. Schwenk's *Sensitive Chaos*.)

In conclusion, we will turn to some remarks made by Dr Steiner on bird flight, which point to an invisible, supersensible realm behind the world of our physical sense impressions. In the lecture cycle *Man as Symphony of the Creative Word*, Steiner speaks eloquently on the nature of birds and the characteristics of their flight. He maintains that nothing in nature exists in isolation; all natural phenomena stand in relationship to each other and to a supersensible world of beings. Wherever we encounter phenomena of nature, behind them there stands the activity of beings. Those beings that, in a sense, accompany birds in flight are the air beings, traditionally called sylphs. 'When in spring or autumn you see a flock of swallows, which produce as they fly vibrations in a body of air, setting an air current in motion, then this moving air current – and this holds good for every bird – is for the sylphs something audible. Cosmic music sounds from it to the sylphs. If, let us say, you are traveling somewhere by ship and the seagulls are flying around it, then in what is set in motion by the seagulls' flight there is a spiritual sounding, a spiritual music which accompanies the ship. Again it is the sylphs which unfold and develop their being within this sounding music, finding their dwelling-place in the moving current of air. It is in this spiritually sounding moving element of air that they find themselves at home'. Although sylphs feel a deep sympathy with the flight of birds, their creative work for the earth, according to Steiner, lies with the plant kingdom, as bearers of light into the plant. Here, however, one must not think only of visible sunlight, but of another kind of light out of which the sylph weaves the ideal plant-form. Thus, the movement of birds in the atmosphere has a relationship to the plant kingdom. Perhaps Steiner was alluding to this association, in part, in the Agriculture lectures when he remarked, 'Modern humanity has no idea how greatly farming and forestry are affected by the expulsion, owing to the modern conditions of life, of certain kinds of birds from certain districts'. In Britain, as in much of the developed world, the large birds of prey have been heavily persecuted. No longer is it a common sight to see these magnificent soarers circling above the British countryside. Not only has the ecological balance been upset by the partial elimination of these creatures, but their particular quality of movement, which belongs to the totality of the landscape, has been all but lost. We can only speculate as to what this loss means to the air beings associated with these birds.

To ensure the future well-being of the earth, modern humanity must begin to awaken consciously to the sphere of activity that animates the natural world. Until that is achieved, our knowledge of nature will remain incomplete and fragmentary, and the full consequences of our actions towards the earth will continue to be hidden from our view. When observing nature, perhaps we can begin to cultivate the attitude that what we see before us are signatures in the sense world of supersensible realities. Sense

impressions, when received actively, can offer clues to lead us beyond the world of appearances to the indwelling beings that permeate all of nature. Birds, with their life-filled, graceful aerial movements, hold a unique position in nature's living tapestry. If we turn our attention skyward, with a sense of reverence, wonder and devotion, we too may someday hear the cosmic music of their flight.



Drawing by Helene Aurell

NOTES AND ACKNOWLEDGEMENTS

The cover design is by Helene Aurell.

The lecture by Rudolf Steiner was translated by George Adams in 1929 and his special qualities as a translator have been preserved. It has been revised for this publication by David Macgregor. The Letter 'From Nature to Sub-Nature' was translated by George and Mary Adams; it is contained in 'The Michael Mystery' published by the Rudolf Steiner Press, London.

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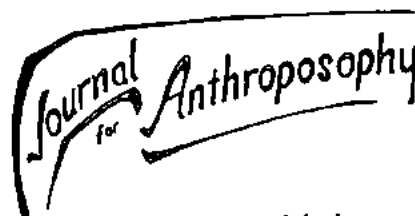
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Colour Plates

The paintings by Helmut Siber are taken from a series of 24 weather paintings following the cycle of the year. They are on rotating exhibition at the Research Laboratory of the Natural Science Section, Goetheanum, Dornach, Switzerland, and are published with their permission.

The water colours and cloud photographs by Michael Wilson are sponsored by the Michael Wilson Book Fund.



SPRING 1986 : NUMBER 43

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