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Seized by Agreement, Swamped by Understanding

Biology’s Room With a View

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The diverse papers which make up this book are variations on a theme which is based in biological science - yet none of the contributors is really a biologist. Our metaphor for describing what we are doing here is that we have gathered together in a room because that particular room provides us with a certain view of our individual areas of interest - a view that may have been previously obscured. We are visiting the house of biology in the hope that we may see more clearly things that we each find baffling about our particular field of work in education, research, or daily living.

It is the biology of Humberto Maturana [1] - and the contributions of other scientists, philosophers, educators, therapists that we may choose to associate with Maturana's work - which provides a common thread throughout the papers published here. We invite you to browse for a while in biology's room with a view and perhaps to look upon some long-familiar territory with a new perspective. There is one note of caution: in certain situations, the window may become a mirror.

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This book is set in a world of growing disillusionment with knowledge and with the use of knowledge in our living together. We have seen religion, philosophy and science, each toppled from its pedestal as the harbinger of truth and the principal means of enjoying more satisfying and enjoyable lives and providing for our children's future. We have seen the artistic pursuits relegated to an extracurricular role in our technologically-oriented life style. Yet each of these is still regarded longingly as a source of inspiration and, especially in the case of science, as the place to look for answers to the many questions which trouble us today. Far from being obsolete endeavours, these are still the wellsprings of our knowledge, including the knowledge of how to use that knowledge wisely.

Another characteristic of the world in which this book is set is an evolutionary, or progressive, view of life and living. Here the analogy of biological evolution has become pervasive in our thinking. This means that everything we have ever done together in this world could be a part of who we are and what we do today. This is the essence of a hopeful view because it suggests that our efforts have not been in vain and our mistakes have not been wasted. By utilising the resources

which we have today and building on the strengths we have acquired to this moment, we can surely progress effectively through whatever obstacles our path contains. This applies whether we choose to see the path as leading to a particular end or not. We would put it that we walk towards a sunset of our own understanding.

At present we could not say that we walk hand in hand, however, nor whether it is absolutely necessary to do so. Modern science has equipped us with a wonderful array of technologies for relieving suffering, providing comfort, travelling freely, communicating across the world, and managing and utilising all of our resources. Naturally, we pay homage to these in various ways. One consequence of this is that we live in the age of the expert and the commodity we seem to value most is information, despite the disillusionment it brings. We do not come together principally to share or learn or experience, but to acquire information and there is always an expert who will tell us what we should do and catalogue our retribution should we fail to heed the advice. The technical expert is still keenly sought, but, for many of us, this idea of certainty of knowledge seems to be a rather mixed blessing.

Many of us feel that the medical beaurocrats, town planners, economic policy makers, industrial chemists, agricultural scientists and other experts in our community have taken too many liberties with our individual lives and can distance themselves too easily from their mistakes. There are signs of serious degradation and a somewhat reckless spending of our natural resources, perhaps irreversibly, which arises from our use of scientific knowledge. Our human experience, particularly in the more affluent societies, is often characterised by fear, loneliness and despair. Although many health problems have been alleviated, some others are becoming worse. We are psychologically resilient and most of us choose not to dwell too long on these problems, but for many there is a compelling need to try to re-vision our relationships with one another and with our world and to try to practise this new vision in our living.

How do we go about this? What kind of knowledge do we need to be able to transcend the methodology which seems to create as many problems as it solves? Is it possible that some kinds of knowledge could enable us to see things differently so that we could use this knowledge to build more sustaining and satisfying relationships? Or does this mean that the idea of knowledge itself has become more fuzzy and uncertain, which can be quite as alarming a prospect as the apparently destructive consequences of too much certainty?

Our deep dilemma is to find a way to cope with what we see as ever-increasing complexity in our affairs, but without necessarily being able to rely on experts and an absolute knowledge. Many seek spiritual solutions and the way of the true mystic has always offered a

form of salvation. Even so, most of us still search, in philosophy and science, for better explanations of our situation and the options which are open to us in our living, *i.e.* our biological existence.

Science or Philosophy - Does it Matter?

What is it that we are doing when we put forward explanations about our living together? Is it science, or philosophy, or both? Could it also be art? We regard these as very different domains of explanation. First of all, what is an explanation? Here, we are particularly influenced by Maturana. We will say that an explanation is a particular type of answer to a question (which, for that matter, may be only implied). It is a reformulation of the experience in question which turns out to be acceptable and satisfying to the questioner; if the language used is not acceptable, then it does not really qualify to be an explanation. So an explanation only exists as such in its acceptance by an observer (who may be oneself, of course). It follows from this that quite different criteria of acceptability are used in the different domains of explanation, *e.g*. in science, philosophy or art.

Thus we need to make a clear distinction between what scientists do and what philosophers do in their business of explanation. As scientists, we have a particular set of criteria for the validation of scientific explanations[2], but we can choose to tackle any phenomenon which we can identify. We start with the experience to be explained and apply the operational coherence of our scientific method. However, as philosophers, our passion is for reflecting on what happens in strict coherence with certain *a priori* principles, premises or values. We start with the principle and use it to explain certain things that have happened.

Scientists are therefore free to change principles, concepts or notions as they go because they are aiming to conserve the validity of the observations (the phenomenon to be explained) whereas philosophers are aiming to conserve a principle or value, so their manner of explaining will have to accommodate to this. An example of this difference is the way in which Einstein dispensed with the principles of space and time in his new scientific explanation of relativity while Teilhard de Chardin preserved the presence of God in his new philosophical explanation of natural evolution.

We find that it is indeed satisfying to act as scientists in much of what we do, but we also find ourselves acting as philosophers at times. Because the difference between the two types of explanation is not trivial, we endeavour to distinguish between them. We are aware that there can be very different consequences according to which kind of explanation is used.

Because of their constitution, philosophical theories inherently have

some restrictive and imperative implications with which we are asked to either agree or disagree. If misused, such dogma can be the basis of an hierarchical authority achieved through the very formidable force of reason. On the other hand, genuine scientific explanation seems to us to have the constitution of being inherently liberating, opening a space for reflection; it provides for a reflexive operation through which respect for difference and for one another can arise in our living together. Out of this arises the significance which we attach to personal preference, in both our private and our public living.

It is not the difference between philosophy and science *per se* which matters most; what matters in human coexistence is the way they are used. We show our preference for scientific explanation because it seems to focus our attention on our doing together, *i.e.* our co-drifting. However, the history of our thinking and doing together makes it inevitable that our prejudices, belief systems and philosophical principles will reveal themselves in various ways. Here we are influenced by attitudes of the hermeneutic philosophy of Gadamer [3] and other "grand theorists" of modern contextual philosophy. We accept that all our explanations are inevitably shot through with the pre-understandings of our tradition and that we cannot entirely avoid being in the situation we are trying to explain.

As well as that, we are aware of a powerful yearning to try to tap some of the artistic, sensual, beauty which exists within all attempts to make some explanation of our world. Art captures the essence of meaning about life in a manner that is, at least partly, indefinable and unspeakable. Our work seems most satisfying to us when science, philosophy and art lie like bodies intertwined, unfolding their respective meanings through the communion which they enjoy in our living together.

A New Biology?

What is so important about biology? Why is it that we are so committed to the science of biology in talking about our daily life? The obvious answer is also a very difficult conundrum. Because we are biological beings, the very process of knowing anything about ourselves, *i.e.* our cognition, is itself a biological phenomenon. To consider what we know about life we must consider how it is that we know it. Knowing how we know is an enormous challenge to our scientific epistemology, but it is one which is being met from within the world of biology itself.

Maturana, and Francisco Varela [4] have been the leaders in this extraordinary new phase of scientific progress. Their work forms a kind of intellectual bulwark against which we lean with some comfort and satisfaction in our explanation of what many people now refer to as the "new biology". Ernst Mayr [5] has said that a new philosophy of

biology is needed as a consequence of the revolution which has occurred in the physical sciences. Charles Birch [6] contrasts a mechanistic with an ecological model for biology in making post-modern proposals for the "re-enchantment of science."[7] A number of other authors have addressed this need to somehow move beyond the restrictions which a mechanistic and essentially linear world view seems to impose, *e.g.* in the scientific explanations which have arisen in behaviourism, sociobiology and neo-Darwinism.

Our concern is not with any controversy about the directions taken in biological science, nor is it to confront any particular issue dogmatically. However, we do seek to enlarge our vision and extend the scope of our science of life, not as a new theory of life, but as a way of talking about the experience of being alive - the dialectic between knowing and doing. Our hope is that the science which beckons us now will not be too spiritually or artistically impoverished to meet the ecological challenges we face.

A leader in organismic biology, Brian Goodwin [8], has called for a liberating paradigm which provides an opportunity to escape from the self-imposed conceptual fetters of the mechanistic view. He and others point out that obvious anomalies in our classical biological explanations herald a paradigm shift of the kind described by Kuhn. Examples of these are the unexplained controlling of biological form, the mysteries of animal behaviour and perception, and the ecological patterns based on mutualism rather than competition which are therefore not accounted for by neo-Darwinism.

The concept of biological evolution as an analogy for human progress has become a powerful theme in world thought. An eloquent exponent of this idea was Jonas Salk [9] who believed that "knowing about living systems suggests a way of thinking about some of the burning issues of our time for which we seek solutions." He drew many parallels between basic biological mechanisms, *e.g.* the immune system, and psychosocial issues in human experience. His advocacy for a new kind of scientist who could merge intuition and intellect has inspired us along with many others. We, too, see biological evolution as a strong metaphor which supports the hopeful vision that it is our progress in self-awareness which will serve humankind best into the future.

More recently, however, the evolutionary concept itself has become highly contentious in science. In *Evolution at a Crossroads,* David Depew[10] and Bruce Weber [11] review post-Kuhnian approaches to evolution and development theory in terms of "the new biology and the new philosophy of science." This includes an attempt at integrating various concepts of adaptation with new ideas about self-organisation, closure of complex systems and hermeneutics applied to the analysis of biological systems. The challenge to

Darwinian selection theory and the current dogma of molecular biology is clear, but the future direction is not.

The overlapping of methodologies from the social sciences and the more traditional biological science, which seems to us a welcome progress in human thought, suggests the idea of a metabiology. Jonas Salk preferred to speak[12] of the evolutionary sequence "prebiological, biological and metabiological" rather than chemical, biological and cultural, because it showed a unifying connection. He argued that some kind of higher cultural evolution of ideas was our only hope of reversing the alarming trends which are so widely canvassed by the many prophets of doom who preach today.

Discussion about this can become a terribly serious business and we are reminded at times of the necessity to laugh at our increasing self-awareness, too, lest it should become increasing self-importance! George Bernard Shaw, with his mighty rhetoric (and apparent desire to live for several hundred years!) clearly stole our thunder in *Back to Methuselah: A Metabiological Pentateuch* which was first performed in 1922: ". . . as the conception of Creative Evolution developed I saw that we were at last within reach of a faith which complied with the first condition of all religions that have ever taken hold of humanity: namely that it must be, first and fundamentally, a science of metabiology." In this work we want to guard against reifying the concepts of which we speak; so we like to poke fun at them as well.

What we mean to suggest by a metabiology is that this work should not revile from paradox, but should grapple with the complementarity of opposites at various levels. Our very use of language is recognised as a second-order concept, being the describing of our describing. Taking a higher-order view enables us to recognise the coexistence and codependence of apparently conflicting approaches - to embrace both linearity and circularity, reductionism and holism, our senses and our reason. Therefore, we do not need to reject any of the details of current biological science, but we try to extend them into another level of operation which is a richer blend of scientific explanation with our actual experience of living. It seems to us that the new does not replace the old - rather it absorbs it and then exists with its past inside.

An example of the meta as a middle way between logical opposites is given by Varela in his essay entitled: *Laying Down a Path in Walking*[13]. He contrasts the dominant paradigm in scientific epistemology, objectivism, with its logical opposite, subjectivism; the dominant view of evolution, adaptationism, with creationism; the dominant perspective in neuroscience, representationism with solipsism, suggesting that, in each case, we cannot really take either path. With his principles of biological autonomy, natural drift and the co-emergence of living units and their world, he claims to "go beyond"

the conflict by "jumping to a metalevel." We may hear something new in the counterpoint between the tune struck by Varela and Maturana and the prevailing strains of the current biological paradigm.

The fundamental epistemological challenge which we face, *i.e.* our very understanding of the construction of human knowledge, connects us with the *Scienza Nuova* of Giambattista Vico and the influential philosophy of Immanuel Kant, from the eighteenth century, and with the subsequent development of constructivism in psychology through Vaihinger and, in this century, Piaget and George Kelly [14]. Thus we have developed the viewpoint that we construct our reality through our interaction and that what we know as objectivity, in the traditional sense, is actually our blind spot. As Heinz von Foerster [15] has wryly observed, "objectivity is a subject's delusion that observing can be done without him. Invoking objectivity is abrogating responsibility; hence its popularity."

The way of thinking which is known as cybernetics underpins and contributes much to this new view that we see. Adopted by Norbet Weiner in the 1940's, its usage developed by people like Warren McCulloch and Stafford Beer in widely disparate fields, the term *cybernetics* has an enormous sphere of influence today. As well as revolutionising much of technology and engineering, its notions of self-reference, autonomy, *etc*. have opened new pathways of understanding in many areas of human experience. One of the leaders in this field, Ernst von Glasersfeld [16], after comparing the technological consequences of cybernetics with the invention of the wheel and the printing press, went on to say, "cybernetics has a far more fundamental potential. Its concepts of self-regulation, autonomy and interactive adaptation provide, for the first time in history, a rigorous theoretical basis for the achievement of dynamic equilibrium between human individuals, groups and societies. . ."

In the application of cybernetics to biology a pre-eminent figure has been Gregory Bateson [17] whose thought will also be with us in this work. Bateson developed an immensely powerful set of ideas about the nature of mental process and the epistemology of living systems. His work on form and pattern, learning, adaptation and his understanding of metaphor in the language about living have a special place in the new biology. He linked this sensitivity regarding natural systems to a sense of aesthetics and the "sacred" and to many matters of ecological and social interaction. At the close of his "last lecture" he wrote: "I believe also that perhaps the monstrous atomistic pathology at the individual level, at the family level, at the national level and the international level - the pathology of wrong thinking in which we all live - can only in the end be corrected by an enormous discovery of those relations in nature which make up the beauty of nature."

Finally there is the matter of the relationship between this biology and

those mysterious phenomena in living experience which many people regard as unscientific, or para-psychological, such as extra-sensory perception. We cannot ignore the need for biological explanations of apparently non-local phenomena such as communication at a distance, energy fields or other invisible regions of influence. Advances in theoretical physics have pointed the way and medical scientists such as Larry Dossey [18] have outlined the possibilities for explaining aspects of biology which appear to operate beyond the limitations of space and time as we currently understand them. Combining biology and engineering, people like Robert Jahn [19] have challenged what they call our "margins of reality." Rupert Sheldrake's [20] interesting and provocative hypotheses concerning morphic resonance are set alongside David Bohm's [21] implicate order and holographic universe, in attempting to extend the boundaries of our conversation in biology in a constructive way.

This is not to say that we should neglect the rigour of our scientific explanation. Perhaps this is the best example of our *modus operandi* - to acknowledge that even our best scientific explanation cannot ultimately distinguish "fact" from "fiction"; that there is inherent value in the coherence of our explanation, nonetheless; and that scientific meaning is not entirely adequate unless it is blended with other forms of meaning such as artistic meaning.

We are acutely aware of what a difficult and dangerous passage it is to navigate between our particular Scylla monster - the rocks of scientific, philosophical or religious dogma - and Charybdis - the whirlpools of intellectual solipsism and illusion - but we see no other course available to us. We resonate with these words of Kaufman [22]: "None of us knows a sure way through our present moment in history. Those dogmatists who think they do are the greatest danger to us all. We must, therefore, work together toward the common goal and the common good, drawing upon whatever resources - religious or secular, philosophical or poetic, mythic or scientific - are available to us, and offering them to each other as we grope toward an unknown future."

Someone [23] has written: "what physics was to engineering in an industrial society, biology can become to ecology in a new society." It remains to be seen whether the biological perspective will continue to influence thought in other disciplines in a profound and lasting way. Meanwhile we are enjoying the view.

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1. Humberto Maturana is Professor of Biology at the University of Chile in Santiago. He originally studied medicine at the University of Chile and biology with J.Z. Young at Oxford before carrying out pioneering work on neurophysiology at Harvard during Ph.D. and post-doctoral studies. His books (with Francisco Varela) *Autopoiesis*

and Cognition: The Realisation of the Living (1980) and *The Tree of Knowledge: The Biological Roots of Human Understanding* (1988) and his numerous publications have established him as one of the leading thinkers in science (particularly biological science) in the world today.

2. These criteria are made explicit in subsequent articles.

3. Hands-Georg Gadamer studied with Heidegger and worked mainly at the Universities of Marburg and Heidelberg, establishing himself as the leading exponent of hermeneutic philosophy. His main works are *Truth and Method* (English translation 1975) and *Philosophical Hermeneutics* (English translation 1976).

4. Francisco Varela is currently Professor of Cognitive Science at the Ecole Polytechnique in Paris. He originally studied with Maturana in Chile and then worked on mathematical biology with Heinz von Foerster at the University of Illinois and cybernetics at the University of Colorado. His books *The Principles of Biological Autonomy* (1979), others with Maturana, and *The Embodied Mind: Cognitive Science and Human Experience* (1991 with Evan Thompson and Eleanor Rosch) and his current pioneering research on cognitive properties of the immune system have established him as one of the world's leading thinkers in biology and cybernetics. He is also co-Editor of the New Science Library published by Shambhala.

5. Ernst Mayr is Alexander Agassiz Professor of Zoology emeritus at Harvard University and the author of many books including *Systematics and the Origin of Species* (1942), *Animal Species and Evolution* (1963) and *The Growth of Biological Thought: Diversity, Evolution and Inheritance* (1982) from which this particular thought is taken.

6. Charles Birch is Challis Professor of Biology emeritus from Sydney University and the author of *Nature and God* (1982) with John B. Cobb Jr., *The Liberation of Life: From the Cell to the Community* (1970) and *On Purpose* (1990). This refers to his 1988 article in *The Re-enchantment of Science - Postmodern Proposals*.

7. See *The Re-enchantment of Science - Postmodern Proposals* (1988), a series which is edited by David Ray Griffin.

8. Brian Goodwin, formerly Professor of Biology at the Open University (U.K.), is a pioneering researcher and lecturer on the organismic or holistic paradigm in biology. The reference here is to a Book Review he wrote for the Network Newsletter No. 43 (August, 1990) of The Scientific and Medical Network.

9. Jonas Salk, after whom the Salk Institute in San Diego is named, was a medical immunologist and philosopher of science and author of

So Like an Angel: Biology and the Nature of Man (1971), *The Survival of the Wisest* (1973) and *Anatomy of Reality: Merging of Intuition and Reason* (1983). This quote is from the first of those books.

10. David Depew is Professor of Philosophy at California State University.

11. Bruce Weber is Professor of Chemistry and Molecular Biology at California State University.

12. In an article *The New Epoch* which appeared in *The Omni Interviews* edited by P. Weintraub.

13. In *Gaia: A Way of Knowing* edited by William Irwin Thompson, page 48.

14. See the article by Michael Mahoney *Constructive Metatheory: 1. Basic features and historical foundations* (1988) and George Kelly's book *The Psychology of Personal Constructs* (1955).

15. Heinz von Foerster was a highly influential cybernetician and biomathematician at the University of Illinois and author of numerous scientific articles and books including *The Principles of Self-Organisation* (1984). He now lives in California. This quote is taken from the *Declaration of the American Society for Cybernetics* by von Glasersfield.

16. Ernst von Glasersfeld, from the University of Georgia, has been a significant figure in cybernetics and radical constuctivism (more needed). This quote is from his *Declaration of the American Society for Cybernetics* (1985).

17. Gregory Bateson was an anthropologist, biologist, philosopher and communicator of grand proportions. His best-known works are *Steps to an Ecology of Mind* (1972) *Mind and Nature - A Necessary Unity* (1979) and *Angels Fear* (1987) which was completed by his daughter Mary Catherine Bateson. This quote is taken from *Further Steps to an Ecology of Mind* (1992) edited by Rodney Donaldson.

18. Larry Dossey is a medical practitioner in Dallas and the author of many articles and books including *Space, Time and Medicine* (1982) and *Recovering the Soul: A Scientific and Spiritual Search* (1989). The reference here is particularly to the latter book.

19. Robert Jahn is the leader of the Princeton Engineering Anomalies Research (PEAR) Program at Princeton University, New Jersey, and the author (with Brenda Dunne) of *Margins of Reality: The Role of Consciousness in the Physical World* (1987).

20. Rupert Sheldrake is a Cambridge- and Harvard-educated biologist

whose books *A New Science of Life* (1981), *The Presence of the Past* (1988) and *The Rebirth of Nature* (1990) have created much interest and controversy in the biological sciences.

21. David Bohm was Professor emeritus of Theoretical Physics at the University of London. Working first at the University of California, Berkeley. and then at Princeton, associated with Einstein and, later, with Krishnamurti, he published widely on quantum mechanics and relativity. His major popular book is *Wholeness and the Implicate Order* (1980).

22. G.D. Kaufman is Professor of Divinity at Harvard Divinity School and this quote is from his book *Theology for a Nuclear Age*.

23. Phrase found on the cover of *Gaia: A Way of Knowing*, edited by William Irwin Thompson.