

SUMMARY OF EMPIRICAL FINDINGS FROM THE NATURE OF ORDER^{*†}

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Architect, scientist, and writer Christopher Alexander is one of the most remarkable thinkers and makers of our time. His books include *A Pattern Language* (1977), *The Timeless Way of Building* (1979), and *A Foreshadowing of Twenty-First Century Art: The Color and Geometry of Very Early Turkish Carpets* (1993). This essay is his recent effort to distill the major discoveries he presents in his masterful four-volume *The Nature of Order* (2002-2005); see *EAP*, winter 2002; fall 2006 for reviews. He wishes to thank Maggie Alexander and Randy Schmidt for help in editing this essay. © 2007 Christopher Alexander. www.patternlanguage.com.

The science of the last four centuries and especially the science of the last 150 years has profoundly shaped our culture and our civilization. We are now living in a world defined by a widely accepted group of statements and kind of knowledge, which was non-existent before. These have changed our view of what a human being is. The offshoots of science have changed how we look at ourselves, how we think and feel, and how we view our social institutions, political institutions, love, war, and race. How we view children, and how we view old age. How we view art and the making of things. And how we view the birth and death of the cosmos.

Yet in this exuberant and fascinating surge of modern science, with all its authority and power, the divide between fact and value remains hardly changed at all. The questions of what we ought to do, how to solve problems, how to act to shape our existence, how we may attain the peaceful form of existence in which a person lives with quiet in one's heart, how to act to protect the planet, how to act so as to protect and help the wretched of the Earth, how to bring loving kindness into the workplace—these issues have hardly been changed. If anything they have become more extreme, and every day more painful.

Science rarely helps us with these matters. We scientists have not yet laid down a way of thought that gives us a foundation of careful and tender action that deals with everyday life, makes common sense, and leads to actions that make the Earth more whole in its people and in its soil and substance. Indeed, the philosophy of science, which has

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† The four volumes of *The Nature of Order* are: Book 1, *The Phenomenon of Life* (2001); Book 2, *The Process of Creating Life* (2002); Book 3, *A Vision of a Living World* (2005); and Book 4, *The Luminous Ground* (2004). The volumes are published by the Center for Environmental Structure, Berkeley, California.

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brought us so far, has also made it more difficult to address these issues. The findings of science have intentionally separated the process of forming mechanical models of physics from the process of feeling, and from appreciation of the poetic whole that forms our own existence.

In brief then, we have not yet found a model in which we may understand things in an overall, wholesome way that is both rooted in fact as deciphered by scientific effort, and also gives us a foundation for moral and daily thought and action. As a result, to put it bluntly, *we do not know who we are*. We can hardly act without floundering morally, or emotionally. Often we find ourselves in the greatest pain because things do not hold together. We cannot find a comfortable picture of our daily actions in relation to the larger whole of the earth and universe.

In *The Nature of Order*, a four-volume work mainly written in the 30 years from 1975 to 2005, I have tried to construct a coherent picture of life on earth, which makes sense of these matters, and gives us something to live for and worth living for.

How does *The Nature of Order* work? First, although the book is very long, it is modest in intent and deals with something so ordinary that most scientific works never even touch it, namely: the everyday world around us, the world of rooms, and streets, and houses, and trees.

On page after page, the four books of *The Nature of Order* (covering 1700 pages in all) try to describe our everyday world in objective terms, yet at the same time, deal with the emotional world which this objective, ordinary world raises in all of us. It is an exploration of the way that we sentient, feeling creatures interact with our surroundings, and of the way that interaction leads us to understand ourselves and the nature of our lives, and ultimately even to understand, in part, the nature of our own souls.

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In the course of this exploration and at its heart, there is a logical and empirical thread of argument, which may be viewed as the core of my four books, and which does establish the necessity of a new view of ourselves in relation to the world. This view ultimately nourishes (and if accepted, could become part of the foundation of) a new kind of hope—a hope that is all the more profound because it links together knowledge from philosophy, science, and religion, and helps us to experience the wholeness of the whole.

It could even shed light on the way wholeness occurs in the universe, in a sufficiently concrete fashion, that we might find help wrestling with the question of God, and the nature of this concept, which has been explored persistently in the last 2500 years; yet still remains shrouded in mystery and confusion. It might give us a path for our own access to that mystery, yet couched in acceptable, and concrete terms of scientific reference.

The sequence of my argument follows a brief introduction to each of the four books, and is arranged, as the books are, in four parts.

Book 1: *The Phenomenon of Life*

To lay a groundwork for understanding built environments which support human well-being, I began about 40 years ago, searching for, defining, and identifying, patterns of space that recurred in buildings, each one dealing with a particular range of problems that was likely to occur in the world of buildings. By about 1975, these investigations, which I undertook with five colleagues, gave us gold. We discovered about 250 invariant spatial patterns, each one associated with the stability of a human-environmental system. These were published in *A Pattern Language* (Oxford University Press, 1977) and in several other books published in the same decade. They have become a standard part of what is known and used by architects.

During the late 1970s and early 1980s, I began to notice that these 250 patterns were themselves special cases of a small number of much deeper configurational properties. I began to hunt for these and try to purify them. In the end, after ten years of work, I had identified 15 of these properties. As I identified these 15 properties, it began to seem more and more certain that all living structure—indeed all “good” structure would be composed of these fifteen fundamental properties.

It is significant that these 15 properties were not confined to buildings and works of art. They are equally visible in nature—that is, in naturally occurring physical systems. One could see that virtually all naturally occurring phenomena had, in one form or another, a configuration which was “composed” from, or at the very least strongly molded by, these 15 properties.

My co-workers and I began to feel that there was, in these phenomena, a recurrent structure of some kind—almost as if one could see the same deep structure in a huge variety of actual phenomena, and that it was so deep that each time it occurred, it took a different form, and was yet, nevertheless always the same.

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The argument of Book 1, *The Phenomenon of Life*, may be captured by the following results that summarize 30 years of observation and experiment:

1. A previously unheeded phenomenon has been observed in artifacts. It may be called “life” or “wholeness,” and can be present or absent in varying degrees in any given thing. This quality, always varying in degree, has been noticed places, neighborhoods, buildings, public space, rooms, parts of buildings, paintings, sculpture, ornament, and in a wide range of other human artifacts.
2. The degree of life there is in a thing is objective. That is to say, experience of relative quality of life in things is largely common to people of different inclinations and cultures. This is a surprise, since it seems to contradict the accepted wisdom of cultural relativity and of the subjective nature of aesthetic experience (demonstrated).

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3. In particular, the quality of life in a thing seems to be correlated with the repeated appearance of fifteen geometric properties—or geometrical invariants—that appear throughout the configuration of the thing (demonstrated).
4. My colleagues and I found it convenient to refer to this quality, when viewed in its geometrical aspect, as “living structure.”
5. I refer to degree of life as an objective quality, because it may be measured by replicable empirical methods. The empirical test that most trenchantly predicts “life” in things, in comparing two things, is a test that asks which of the two induces the greater wholeness in the observer, and/or which of the two most nearly resembles the observer’s inner self (demonstrated).
6. Surprisingly, in spite of the vast variety of human beings, human culture, and human character, there appears to be substantial agreement about these judgments—thus suggesting a massive pool of agreement about the deep nature of a “human self,” and possibly suggesting that we may legitimately speak of “the” human self (at least strongly indicated).
7. The fifteen properties are the ways in which living centers can contribute to the coherence of other living centers (demonstrated). (A center is a field-like centrality that occurs in space).
8. The same fifteen properties also occur repeatedly in natural systems ranging in scale from 10^{-15} to 10^{-8} meters, on the surface of the Earth again ranging from 10^{-5} to 10^5 meters, and then again at cosmological scales ranging from 10^9 to 10^{26} meters.
9. There is substantial empirical evidence that the judged quality of buildings and works of art—judged by knowledgeable people who have the experience to judge their quality with some objectivity—are predicted by the presence of the fifteen properties (demonstrated).
10. It is possible that the properties, as they occur in artifacts, may originate with human cognition, and work because of cognition, and that is why we respond to them.
11. However, that cannot explain why they also occur and recur, and play such a significant role in natural phenomena.
12. Centers appear in both living and non-living structures. But in the living structures, there is a higher density and degree of cooperation between the centers—and this feature comes directly from the presence and density of the fifteen properties (demonstrated).
13. The appearance of living structure in things—large or small—is also correlated with the fact that these things induce deep feeling and a feeling of connectedness in people who are in the presence of these things (demonstrated).

Book 2: *The Process of Creating Life*

How does living structure come into being? Where does it come from? And why do these structural properties keep recurring?

It is more useful to ask this question about the phenomenon as it appears in nature, than in architecture, since in nature living structure is being created much of the time, in architecture only sometimes. Yet it is a question that—in this form—has rarely, or hardly ever been asked from within the mainstream sciences. As a rule, scientists take it for granted that naturally occurring structures are beautiful. So much so, that the questions “Why?” or “How do things become beautiful?” do not usually seem important to a scientist, and are rarely posed as *scientific* questions.

But when seen through the eyes of an architect, or looked at in the scale range that I look at professionally, these two questions come into very sharp relief. They are questions that need to be answered. When one looks at the architecture and space planning of modern cities, it is certainly obvious that human beings can manage to make a terrible mess of their surroundings. This shows us, by default, that beauty does not come about automatically. Yet in nature it does seem to come about without effort!

Evidently, then, we must conclude that there are *particular* types of processes which occur in nature and which repeatedly, without effort, make things beautiful. It must be that somehow these natural processes are constrained or specialized in some way that allow or encourage nature’s phenomena to become beautiful, while the same particular specialization of process is missing from contemporary architecture, planning, and development.

What process is it that is universally present in the processes of nature but is rarely present, or most often missing, from the contemporary processes of town building and contemporary architecture? This is a new and important scientific question. Having arrived at the description of the fifteen properties, and seen them as vitally important to structure in *both* nature and architecture, the question about the origin of good process (as opposed to bad) can give us a clue to the answer. By the early 1990s I had begun to focus on this particular class of processes (what I later came to call “unfoldings”), and asked why the underlying unfoldings of nature and traditional architecture are *able* to create harmony and beauty without effort, while the processes of modern urban construction are *not* able to do so.

I believe these kinds of processes have so far escaped attention because for scientists there has been no special reason to pay attention to them. They are widespread in nature, and are not easily contrasted with other, less positive processes. It is easier to identify the unique character of positive processes in architecture, because in architecture, where mistakes are common, one is forced to ask how harmony comes about when successes occur. This is why these transformations first surfaced in my studies in the field of architecture.

The sequence of the argument, as set forth in Book 2, *The Process of Creating Life*, goes like this:

14. The structure of living things has been shown to have a predictable geometric coherence at least partly governed by the fifteen properties presented in Book 1 (demonstrated).
15. If we examine the origin of those things in nature and in human art that possess living structure, it turns out that this living structure comes about, almost without exception, as a result of an unfolding process, which draws structure from the whole, by progressive differentiation (demonstrated).
16. More particularly, it is possible to define a new class of transformations—“structure-preserving” or “wholeness-extending transformations”—which allow continuous elaboration of any portion of the world, according to non-disruptive and healing acts.
17. These wholeness-extending transformations will continuously elaborate and heal the place where they are operating, and thus generate an architecture which is life-giving, deeply appropriate to the place, and able to rejuvenate, spiritually, the people who live there and work there. (demonstrated).
18. In addition, it can be shown that these kinds of transformations generate the fifteen properties as a natural by-product of their wholeness-extending action (demonstrated).
19. It is also precisely the use of these wholeness-extending transformations which, in history, caused the appearance of the greatly loved, and now treasured, traditional environments all over the world (demonstrated).
20. On the negative side, it can also be shown that the environments typically created by commercial development in the last 100 years are generated by an almost diametrically opposed system of transformations which disrupt the world—they are indeed wholeness-*disrupting* transformations (demonstrated).
21. It may be inferred that healthy environments *can* only be generated by actions and processes based on wholeness-extending transformations. If we hope for health or living structure in our built environment, it is reasonable to say that the entire social process of project initiation, design, planning, and construction *must* be revised to incorporate the necessary processes.
22. Not surprisingly, the new methods and processes required to achieve this healing, will have—as a practical matter—to be substantially different from present-day commercial methods, thus requiring great courage, and a widespread willingness to make serious changes in society (demonstrated).
23. Demonstrations given throughout Book 3 show how a wide variety of workable wholeness-extending processes can give rise to effective unfolding in practice, and can be used to generate buildings and environments that have greater than

* Note: In Book 2, the term “structure-preserving transformations” is used throughout. Since publication of the book, I have found it helpful, sometimes, to use the more expressive term “wholeness-extending.”

normal degrees of life, coherence, adaptation, and harmony with their surroundings.

24. It is the holistic nature of these step-wise unfolding processes which governs the coherent quality and deep adaptation of the end-result configurations. As far as I am aware, only this kind of process can place sufficient, and appropriate emphasis on the well-being of the whole.

Book 3: *A Vision of a Living World*

Having achieved some practical insight that helped us to understand how unfolding works in the sphere of community building, physical building, and construction, my colleagues and then I undertook a long series of experiments over a 30-year period, to find out to what extent these methods are feasible in practice, and what their effects are on people, and on people's individual and social well-being.

The idea of unfolding has a neat theoretical description. But in the complex practical reality of a real city, or a real neighborhood, and a real human culture, this unfolding process takes on a huge variety of shapes and sizes and configurations. This is such a dominant feature, that it is only by working with hundreds of real examples that I had the opportunity to evaluate, and refine, the unfolding procedure.

In every case we tackled—and there were examples with a huge spread of variation in their circumstances, cultural settings, scale, cost, and conditions—I began by first looking to see what might be appropriate to the particular range of conditions, then tried to *do* what was appropriate by finding practical ways in which unfolding could be successful in those conditions, and then followed the rules of unfolding as much as possible at every step.

The descriptions of these real cases in Book 3 cover some 700 pages. They may be regarded as a long series of experiments, all checking to see whether the theoretical idea of unfolding makes practical sense in architecture, and also gets the hoped-for practical results.

Beyond these important verifications, the many, many experiments and building projects in which these theoretical ideas were being tested, also gave us a much deeper understanding of the ideas themselves.

Probably what is most marked, both from a human point of view, and from a theoretical point of view, is the idea of *belonging*. By this I mean the idea that what is most important in the built world is the extent to which people feel themselves at home there. They experience, quite literally, the feeling that “I belong here.” This is far from the experience of material possession. It can occur easily in the long grass at the edge of a meadow. It does not matter which farmer actually owns it.

What matters is the feeling of rightness and unity with the grass that is so easily experienced for a person lying there. It can occur in cities, a bench by the river Seine, quiet, with the hum of traffic nearby. It can occur in a room, where a person feels at ease:

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once again far from the accumulation of kitsch (modern or ancient) that interior designers may too easily put there. It is a comfort which comes from the fact that everything in view and to hand has arisen by careful choice and fits and creates comfort, for the soul of an individual person or an individual family. This belonging follows directly from unfolding.

For example, the overwhelming idea that the ultimate purpose of the work was to allow the “I” (another word for self) to show itself, became of greater and greater practical significance. This is a topic developed fully in Book 4. But the practical importance and usefulness of this idea allowed me to see, more and more that it was this quality in things and places, above all, which was the thing that mattered most.

Although, when written down in words, this may seem a slight thing, almost fanciful, especially to someone without a scientific background, I can assure the reader that it is no light matter. The sheer importance of this idea and the profound reality of this quality when it is attained, left a striking impression on all of us. The more years any one of us had spent in making things within this way of understanding the world, the more serious and essential we knew it to be. This cannot be overlooked. I would say that it is in many ways the most important aspect of this subject.

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Continuing the sequence of argument, as it appears in Book 3, *A Vision of a Living World*:

25. The core quality of an environment which is unfolded through wholeness-extending transformations will be that it is deeply related to human beings—in a way that may be called “belonging.” (demonstrated)
26. This belonging must be and will be something related to people’s everyday inner feelings. The relatedness to inner feelings will not be trivial but leads, rather, to a far deeper substance than the artificial constructions currently hailed as “art.” (demonstrated)
27. Structures created by a process of unfolding are likely, in addition, to have a wider range of physical and human characteristics—far wider, than the range of those visible in the homogeneous commercial projects of our time. They will, by their nature and by the nature of the wholeness-extending transformations of land and people, nourish the land and people, and give rise to a great depth and substance that provides genuine support for human beings (demonstrated).
28. The additional quality that will arise is that the environment made in this way, will be “sustainable” *as a whole*, and in a deeper and more comprehensive sense than the kind of technological sustainability that has become fashionable in recent years.
29. Book 3 provides dozens of examples of buildings and building complexes where wholeness-extending transformations have been at work in different environmental and human settings. One sees, from the examples how much richer and more various both the processes and the resulting products are (widely demonstrated).

30. Furthermore, in all these example projects, there is a richer variety and greater number of living centers, at all scales, ranging from the very large to the very small. When one examines these examples, the characteristic change of overall quality that these techniques induce, is plain to see (demonstrated).
31. It is anticipated that such environments will, by their nature, give honor and respect to all people on earth (partially verified, but certainly not yet truly demonstrated, since many more examples from different cultures still need to be built and tested).
32. As far as the extant examples are concerned, they seem to come closer to a new form of collective art, which expresses the true nature of people able to express and live their own aspirations, culture by culture. All these examples encourage the people who live there and work there to increase their own self-esteem and that of others.
33. By honoring the wholeness of the earth and its neighborhoods, these newly built places, in their physical character and presence, are also likely to encourage and support new depths of spiritual seriousness in the people who make them and for whom they are made.
34. Such environments have not previously been an object of scientific study. The in-depth analysis and description of such profoundly made environments, itself makes progress, advancing our understanding of the basic qualities and characteristics of the environment and offering an approach to healing.
35. Most important is that the many experiments described in Book 3 use the generating processes put forward in Books 1 and 2, and *one can see the results*. Briefly put, the places are experienced by people who live in them, work in them, or visit them, as something that establishes a deeper connection with the human being. In some fashion, which appears inescapable, the theory of Books 1 and 2, is confirmed by the physical results in building and neighborhoods, and by the way these places work—far more deeply, so it is argued by people who have been in them—than the normal buildings and plans made by other contemporary methods (demonstrated).
36. It is to be hoped that the empirical base will not only provide a sturdy underpinning for a new way of regarding the world we live in, but will also provide a basis for social and political methods of achieving these results on a wider scale. They also provide an interpretation, backed by empirical findings, that describes the interaction of people and their environment in a very much deeper fashion than we have been used to in contemporary dialogue. Something has shifted.

Book 4: *The Luminous Ground*

In the fourth chain of my argument, I come back to the process of *doing* any work of unfolding and the core activity that needs to be followed for the unfolding to arise successfully. This depends on a cognitive state that will allow a human being—any artist or maker or architect or planner, indeed anyone—to perform an unfolding successfully. This requires that he pay attention to the *whole* (not always easy)—a skill that must be learned since it requires that the maker forget himself sufficiently to be able to act as nature does.

Let us now come back to the centers from which wholeness is composed, with a deeper look at the nature of these centers. In Book 1, I defined a center as a field-like centrality that occurs in space. It is not an object. It is not a point. It is a holistic phenomenon that appears within a larger whole.

Wholeness is composed of centers. So we have a recursive phenomenon here: centers appear in wholeness; wholeness is composed of centers. Each center has some degree of life. The life that a center has is a function of the configuration of centers that surround it and of the degree of life which these surrounding centers have. In slightly different language, a living center is a center which is unusually dense in other living centers.

Now, conceptually, it is not easy to hold on to this enormous multiplicity of interconnected living centers, each working on the others and doing so through the action provided by the 15 properties. Towards the end of my efforts to understand this phenomenon, I came to a formulation that expressed this in a helpful way. Namely, I chose to use the word “beings” to describe living centers. This language was slightly shocking, since it smacked of sensationalism, even of exaggeration. However, I found it extremely helpful to think of, and see, living centers—the focal points of a living structure—as “beings.”

What the word does that is especially useful to careful analysis is to avoid the often antiseptic language of mathematics and admit, into the phenomenon of living structure, a sense that life in some form—mythical, poetic, artistic, biological—is a real thing, a thing that has spirit. When one conceives a living structure as made of a multitude of *beings*, it allows one to give dignity to the fact that it really is *life* that is being created and that has established its presence there, not only an antiseptic shell.

In the first part of Book 4, I describe this apparent life as it appears in technically “dead” stones, in marks of paint, in the roof of this certain building, in a window or a window pane of another. This way in which an inanimate configuration springs to life, and calls forth life in us as it is adjusted is what brings us face to face with the significance—and meaning—of the phenomenon!

I do not want to go *too* far with the concept of beings, and have introduced the term only because it conveys a better sense of the enormous nature of what is going on when centers form in space. Nevertheless, it does underline what has already been established in early sections of this sequence of argument: namely, that one must conclude that space itself is somehow being-like, has the potential for beings to appear in it, not in the mechanistic sense of assembly from components, but in the far more startling sense

that something within space and matter can be awoken by the presence of the proper configurations. It is this that begins, firmly, to close the argument, and points towards a very much deeper nature of matter and space than we are used to.

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Completing my summary of the sequence of argument, the following steps are laid out and explored in Book 4, *The Luminous Ground*:

37. The empirical arguments laid out in Books 1, 2, and 3, are fairly straightforward. They provide a concrete, and substantial way of understanding the quality of artifacts, works of nature, works of building. But what has not been visible, so far, is that the web of these empirical findings, leads to an altogether deeper, and somewhat mysterious picture. This picture must be understood, in order that one can fully grasp the significance of the earlier empirical material.
38. Let us come back, then, in this fourth book, to the whole: the nature of the living whole, and the way that any one part of that whole plays its role within the larger whole, binding everything together. To some degree we have a picture of the way this happens, also of the processes that make it happen. But what is the *meaning* of these processes? What is their significance in the larger scheme of things?
39. We have seen that living structure occurs when centers unfold from the whole and form complex binding schemes in which larger centers emerge from the whole, intensify the life of whole, and are built from smaller centers that are created (demonstrated).
40. We have also seen, repeatedly, that any example of living structure creates a connection between that structure and the human self and is in some definite sense “personal.” (demonstrated)
41. These observations get empirical support from the experiments described in Book 1, which indicate that perception of a self-like quality in a thing (whether it be nature or artifact) provides the most direct access to the degree of life in the thing (demonstrated).
42. The observations also get strong empirical support from the experiments described in Book 3, where attention to the living structure in an environment strongly increases the feeling of belonging that people experience there (demonstrated).
43. These two conclusions do suggest that what I call living structure—whether it occurs in nature or in art—is entangled with the human self, in some fashion that we have not previously understood.
44. More specifically still, every single one of the living centers that appear repeatedly in living structure, at many overlapping scales, has a character connected to the human self.

45. Yet more exactly, in any environment that has life or, for that matter, in any system or work of art that has life, there are multiple and sometimes very large numbers of living centers that appear to be being-like, or self-like. This appears to be a fact of nature, *not* merely a psychological or cognitive interpretation of what is going on.
46. Experiments, observations, and descriptions of these phenomena finally bring us to the brink of something one can hardly avoid saying, namely: that the natural phenomena and artifacts made in this way, and the living structure they exhibit, strongly suggest the need for a modified understanding of the nature of matter.
47. It appears that the process of making an environment living will succeed or not to the degree that the making process is based on the repeated use of the criterion, "How much is this part, or that part, or that whole like my true, inner self?" We thus find a substantial and empirically-based clue to the making of ecologically wholesome places, of spiritually sustaining places, and of energetically self-supporting places.
48. By empirical standards, this is a startling proposal. All these forms of making are dependent on perceptions and actions that might be imagined as appropriate and natural for a 14th-century Christian monk, or for a Sufi saint. They are far removed from the current late-20th century version of our scientific world view, and what it tells us to do.
49. But if it is indeed true that the view presented turns out to be a sound and testable picture of reality, as my experiments suggest, we must then be prepared, at least, to contemplate and perhaps in the end *accept* a modification in our present-day view of the nature of space and matter.
50. In any case, whether we succeed in this renewal or not, it does seem that there are good grounds for reviewing our picture of the nature of living structure, and our picture of the matter from which we are made and which surrounds us (demonstrated).
51. At the very least, in my experience, thoughtful people who have contemplated these issues and thought about them carefully, find, sometimes with a sigh of acceptance and relief, that within this frame of reference they are finally able to live in a world that makes sense. They are able to act in a way that makes sense and that is good, without it being based on any current canons of morality.
52. This is a world view in which acceptance of the whole and efforts to heal the whole, in the built world, can be seen as the most profound and most important forms of prayer. They are consistent with modern science and yet call into question some of science's most deeply rooted assumptions.
53. It is a new kind of thought about matter, in which our understanding of the world is coupled with the idea of healing the world, and in which our relation with the world is to be understood through means that our own self, or our own selves, are in the world, part of it, not separated from it.
54. In such a modified world-view, science can perhaps be brought into alignment with human feeling and awareness.

55. An apparent link between environment, self, God, and matter has shown itself. It has been uncovered, by carefully raking through the ashes of our mechanical civilization, and in the attempt to build a phoenix of living structure that may arise again, if we choose to pay sufficient attention to it.
56. In any case, the world can become beautiful, as a result of efforts based on this new understanding (demonstrated).
57. As a result of these investigations it may turn out to be best if we redefine the concept of God in a way that is more directly linked to the concept of “the whole,” This would then permit the reconciliation of our daily efforts with the well-being of the whole—something that is anyway necessary from a scientific point of view. But in so doing, we may be able to unite the mental and emotional territory of what was traditionally called God, in a way that provides the connectedness that people crave, and in a way that allows people to feel humility and responsibility for the whole, as part of the sum total of mentality that once existed in other cultures and that must exist in our own highly modern civilization in a way that is true to the facts.
58. We would then have, as a goal, the making of a world which is literally made, as far as possible, from “self.” This term refers, of course, to the eternal self that lies in each one of us and also manifests itself in living structure. It seems to demand that the world is to be made of *this* substance.
59. But, even more shocking and exciting, there may lie ahead new ways of understanding physics and biology in these terms also: so that space and matter would be linked and entangled, literally, with the source of all consciousness, by reference to the whole and its hitherto misunderstood properties.

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The empirical findings—those that I have marked as “demonstrated”—are expressed in the four books with sufficient background so that it is clear that they are testable and *have* been tested experimentally. It is also clear that further, and more rigorous experiments along the same lines can be done, with larger samples, to reach conventional standards of scientific acceptance.

I have not pursued this traditional scientific avenue to its full conclusion, since the construction of the *logic* of this chain of reasoning was a harder and more important task, arduous in the extreme. I spent most of these last thirty years working to make the chain of argument as clear, logically, as I was able to do, and doing sufficient pilot experiments to establish the reasonableness of all the items in the chain. My experiments brought results that have established a *prima facie* case that the findings are compelling, reasonable, and plausible. They would now benefit from confirmation through further experiments conducted along more rigorous lines.

I look to my colleagues, and to a new generation of scientists, to carry this work forward with the necessary rigor.