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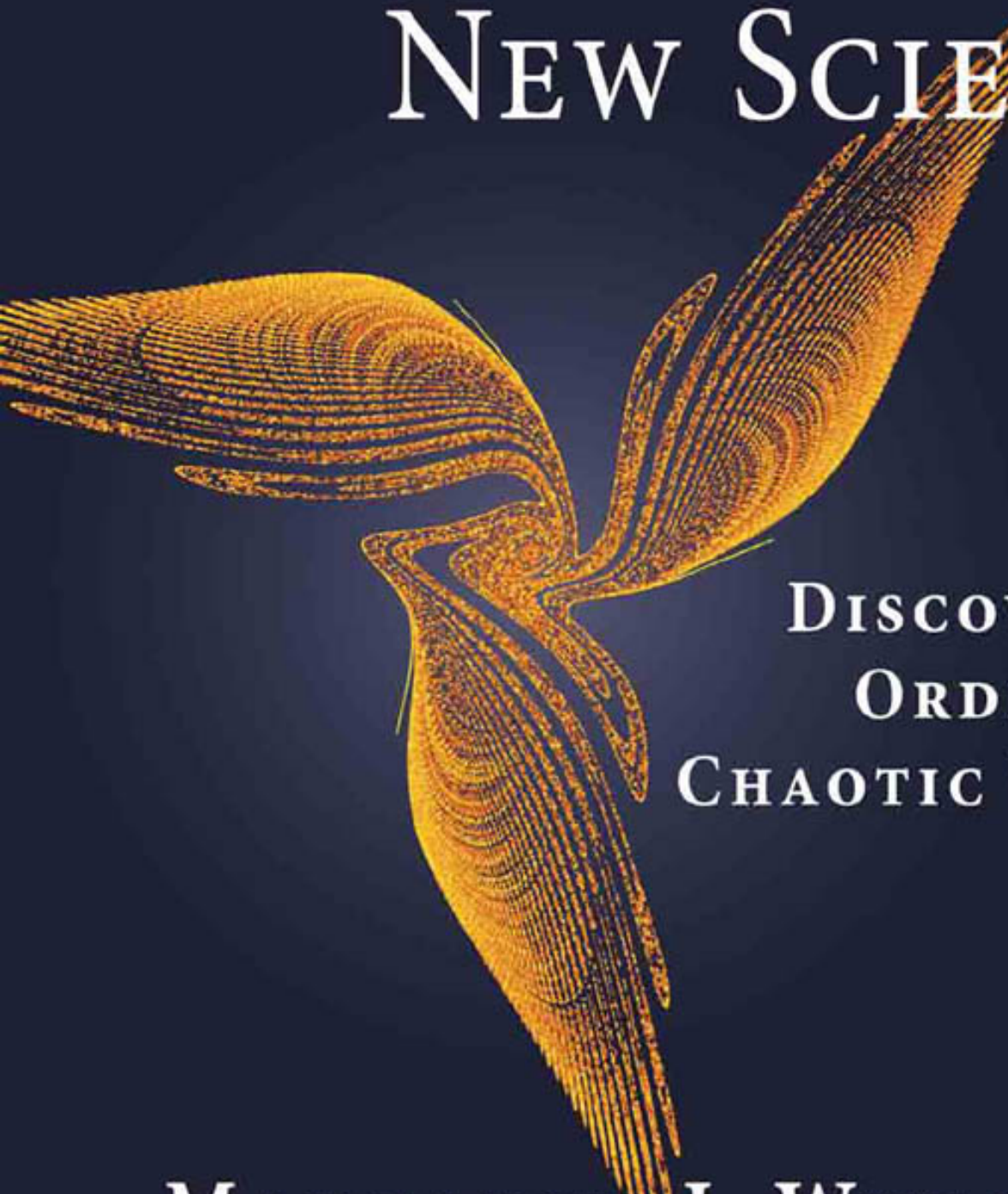
LEADERSHIP *and the* NEW SCIENCE



DISCOVERING ORDER IN A CHAOTIC WORLD

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An Excerpt From

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by Margaret J. Wheatley
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Prologue: Maps to the Real World

I have always thought of this book as a collection of intriguing maps, much like those used by the early explorers when they voyaged in search of new lands. Their early maps and commentaries were descriptive but vague, enticing but not fully revealing. They pointed in certain directions, illuminated landmarks, warned of dangers, yet their elusive references and blank spaces served to encourage others to explore and discover. They contained colorful embellishments of places that had struck the discoverer's imagination, yet ignored other important places or contained significant errors. Many early maps contain warnings: "Here there be dragons," or "Regions very imperfectly known." But these maps contained enough knowledge to inspire those who were willing, to dare similar voyages of their own.

The territory that I began mapping when this book was first published in 1992 has now revealed many more of its features. It is the world we live in daily, a world of uncertainty, sudden shifts, and webs of relationships extending around the world. In 1990, as I began to apply the new sciences to the challenges of leadership, I noted that "we live in a time of chaos, as rich in the potential for disaster as for new possibilities." What's ironic is that I *now* look back to 1990 as the good old days, when we had time and space to reflect on ideas, when we had the luxury to think about a new worldview and consider whether we believed it or not. The tone of this book reflects that more spacious era. It is a gentle invitation to become curious, to discover your own

questions, to see if your experiences confirm or disconfirm new science, and to engage with me and many others as explorers of this new world only beginning to become visible.

But now my voice of invitation needs to be prefaced by a clear, more insistent voice. Now I am the town crier sounding the alarm. The world has changed. The worldview of the sciences described here is no longer hidden in books. It blares from news reports and blazes across our screens in the terrifying images of these times—wars, terrorism, migrations of displaced people, hurricanes, earthquakes, tsunamis. Chaos and global interconnectedness are part of our daily lives. We try hard to respond to these challenges and threats through our governments, organizations and as individuals, but our actions fail us. No matter what we do, stability and lasting solutions elude us. It's time to realize that we will never cope with this new world using our old maps. It is our fundamental way of interpreting the world—our worldview—that must change. Only such a shift can give us the capacity to understand what's going on, and to respond wisely

I've been out in the world for many years describing the new worldview that science offers us. In my travels, I've met hundreds of thousands of people who have shifted their view and are creating organizations that are adaptive, creative and resilient. Yet many others are more cautious and doubtful. Some people can't be convinced that anything has really changed—the old ways still work fine for them. Others believe that organizations can only function well, especially in times of chaos, by using command and control leadership and hierarchical structures. And many want evidence that these strange new concepts apply 'to the real world.'

Here is the real world as I experience it. It is a world where small groups of enraged people alter the politics of the most powerful nations on earth. It is a world where very slight changes in the temperature of oceans cause violent weather that brings great hardship to people living far from those oceans. It is a world where pandemics kill tens of millions and viruses leap carelessly across national boundaries. It is a world of increased fragmentation

where people retreat into positions and identities. It is a world where we have very different interpretations of what's going on, even though we look at the same information. It is a world of constant surprise, where we never know what we'll hear when we turn on the news. It is a world where change is just the way it is.

This dramatic and turbulent world makes a mockery of our plans and predictions. It keeps us on edge, anxious and sleepless. Nothing makes sense anymore. Meaning eludes us. Some offer explanations that this is the end of times or the age of destruction.

Whatever your personal beliefs and experiences, I invite you to consider that we need a new worldview to navigate this chaotic time. We cannot hope to make sense using our old maps. It won't help to dust them off or reprint them in bold colors. The more we rely on them, the more disoriented we become. They cause us to focus on the wrong things and blind us to what's significant. Using them, we will journey only to greater chaos.

Now that I've spent years applying the lens of new science to organizations, communities, governments, nation states, and to myself and family, I can report on the gifts available with a new paradigm. I have discovered insights and explanations about why things are unfolding as they are. I have been inspired to experiment with new ideas and solutions. I feel I am learning how to move more effectively and gracefully through this time.

But I have also discovered how hard it is to surrender a worldview. When scientists confronted this challenge at the beginning of the 20th century, they couldn't accept the world revealed to them in their experiments. They described this new world as strange, puzzling, troubling, bizarre, absurd.

When our worldview doesn't work any longer and we feel ourselves sinking into confusion, of course we feel frightened. Suddenly, there is no ground to stand on. Solutions that worked no longer do. The world appears incomprehensible, chaotic, lacking rationality. We respond to this incoherence by applying old solutions more frantically. We become more rigid about our beliefs. We rely on habit rather than creating new responses. We end up feeling

frustrated, exhausted and powerless in the face of so much failure. These frustrations and fears create more aggression. We try to make things work by using brute force rather than intelligence and collaboration.

It was only when scientists were willing to accept their confusion instead of fleeing from it and only when they changed the questions they were asking, only then could they discover the insights and formulations that gave them great new capacity. Once this new worldview came into focus, scientists reengaged with their work with new energy. Wonder, curiosity, and the delight of discovery replaced their fatigue and frustration. I am hopeful that we too can regain our energy and delight by looking at the world of organizations through their worldview. I believe their maps are reliable guides to lands of promise, where human creativity, wisdom and courage can be fully engaged in creating healthy and enduring organizations and societies.

You will find maps of many varieties in this book. Some describe specific new science findings in enough detail that, hopefully, you understand their terrain. Others point out less explored places that need further inquiry. Still others are very detailed, drawing deliberate connections between science and organizational life. And finally, there are records of my personal journey, what I felt and experienced as I brought back questions and insights and applied them in my own work.

Like anyone, my own training and world view bias me. I have focused on the scientific discoveries that intrigued my organizational mind and have ignored many others. This is neither a comprehensive nor a technical guide to new science. It recounts, instead, the voyages I took to but a few of the emerging areas in science, those that enticed me. I was intrigued by three different areas of science: quantum physics, self-organizing systems, and chaos theory. Because I develop the science as I go and relate these three to one another, things will make more sense if you read the chapters in order.

The Introduction and Chapter One introduce all three sciences and the contributions they make to our understanding of the way the world works. These first chapters also provide some initial explanations of sources of order in

the universe and speculations on the fears and conditioning that prevent us from appreciating the way that order is created in living systems.

Chapters Two, Three, and Four explore the implications of quantum physics for organizational practices that have, until now, been derived from the seventeenth-century world view of the physics of Isaac Newton. Quantum physics challenges our thinking about observation and perception, participation and relationships, and the influences and connections that work across large and complex systems.

The next chapters, Five and Six, focus on living systems and some new concepts emerging from biology and chemistry. These chapters introduce new ways of understanding disequilibrium and change, and the role disorder plays in creating new possibilities for growth. Information, in our self-organizing universe, is the primary resource necessary to bring things into form. New interpretations are required for there to be new forms or new life. Self-organizing systems demonstrate the ability of all life to organize into systems of relationships that increase capacity. These living systems also demonstrate a different relationship between autonomy and control, showing how a large system maintains itself and grows stronger only as it encourages great amounts of individual freedom.

Chaos theory is the subject of Chapter Seven. Chaos is a necessary process for the creation of new order. This is a world where chaos and order exist as partners, where stasis is never guaranteed nor even desired. I describe several lessons learned form the relationship between these two great forces and how we might think about the workings of chaos in our lives and organizations. I also explore lessons to be learned from fractals—how nature creates its diverse and intricate patterns by the presence of a few basic principles combined with large amounts of individual freedom. And I offer my own observations for how our human need for meaning serves to bring order out of chaos.

Chapter Eight explores life's extraordinary capacity to change, to adapt and grow as required. I explain what I believe to be the underlying processes in living systems that give them this capacity. We have spent several decades

attempting to change organizations, communities, nations and each other. We have not been successful in these attempts, or they have resulted in troubling unintended consequences. With so many failures, it seems clear that we need to rethink our basic assumptions about how change happens—for this, life is the best teacher.

In Chapter Nine, I draw together various principles from the sciences to highlight those that can contribute to a "new science" of leadership. This new worldview, with its emerging maps and insights, can teach us how to make sense of this world. Much discovery still awaits us, and I hope many more of you will join in.

And in case you need any more convincing that we need a new worldview to navigate these chaotic times, I have written a new chapter that applies these ideas to "the real world." Chapter Ten uses the lens of new science to bring into focus two of our most critical needs: our ability to respond to disasters and our ability to stop terrorism. For me, the lens of new science illuminates these two challenges brilliantly. It allows us to see things that are invisible with the old lens, the deeper dynamics at play in disaster relief efforts and terrorist networks. Once these dynamics become visible, we have the means to respond far more intelligently to these critical dilemmas. This is the promise of a new paradigm—unsolvable problems suddenly become solvable. We must make use of this promise before the world disintegrates into even more chaos.

The Epilogue closes the book on a more personal and philosophical note. I describe my own discoveries about the nature of this journey and the process of discovery. And I encourage us to understand that we can't make this journey alone—we need good companions, patience, endurance, and courage. After many years and difficult passages, I feel grounded in this new land, nourished by its ideas, and hopeful about its promises. I hope you too will venture forth to make your own discoveries, which you will then offer generously to the rest of us.

Introduction

Searching for a Simpler Way to Lead Organizations

I am not alone in wondering why organizations aren't working well. Many of us are troubled by questions that haunt our work. Why do so many organizations feel lifeless? Why do projects take so long, develop ever-greater complexity, yet too often fail to achieve any truly significant results? Why does progress, when it appears, so often come from unexpected places, or as a result of surprises or synchronistic events that our planning had not considered? Why does change itself, that event we're all supposed to be "managing," keep drowning us, relentlessly making us feel less capable and more confused? And why have our expectations for success diminished to the point that often the best we hope for is endurance and patience to survive the frequent disruptive forces in our organizations and lives?

These questions had been growing within me for several years, gnawing away at my work and diminishing my sense of competency. The busier I became with work and the more projects I took on, the greater my questions grew. Until I began a journey.

Like most important journeys, mine began in a mundane place—a Boeing 757, flying soundlessly above America. High in the air as a weekly commuter between Boston and Salt Lake City, with long stretches of reading time broken only by occasional offers of soda and peanuts, I opened my first book on the new science—Fritjof Capra's *The Turning Point,* which describes the new world

view emerging from quantum physics. This provided my first glimpse of a new way of perceiving the world, one that comprehended its processes of change, its deeply patterned nature, and its dense webs of connections.

I don't think it accidental that I was introduced to a new way of seeing at 37,000 feet. The altitude only reinforced the message that what was needed was a larger perspective, one that took in more of the whole of things. From that first book, I took off, reading as many new science books as I could find in biology, evolution, chaos theory, and quantum physics. Discoveries and theories of new science called me away from the details of my own field of management and raised me up to a vision of the inherent orderliness of the universe, of creative processes and dynamic, continuous change that still maintained order. This was a world where order and change, autonomy and control were not the great opposites that we had thought them to be. It was a world where change and constant creation were ways of sustaining order and capacity.

I don't believe I could have grasped these ideas if I had stayed on the ground.

During the past several decades, books that relate new science findings for lay readers have proliferated, some more reputable and scientific than others. Of the many I read, some were too challenging, some were too bizarre, but others contained images and information that were breathtaking. I became aware that I was wandering in a realm that created new visions of freedom and possibility, giving me new ways to think about my work. I couldn't always draw immediate connections between science and my dilemmas, but I noticed myself developing a new serenity in response to the questions that surrounded me. I was reading of chaos that contained order; of information as an essential, nourishing element; of systems that fell apart so they could reorganize themselves; and of invisible influences that permeate space and affect change at a distance. These were compelling, evocative ideas, and they gave me hope, even if they did not reveal immediate solutions.

Somewhere—I knew then and believe even more firmly now—there is a simpler way to lead organizations, one that requires less effort and produces less stress than our current practices. For me, this new knowledge is now crystallizing into applications even as I realize that this exploration will take many years. But I no longer believe that organizations are inherently unmanageable in this world of constant flux and unpredictability. Rather, I believe that our present ways of organizing are outmoded, and that the longer we remain entrenched in our old ways, the further we move from those wonderful breakthroughs in understanding that the world of science calls "elegant." The layers of complexity, the sense of things being beyond our control and out of control, are but signals of our failure to understand a deeper reality of organizational life, and of life in general.

We are all searching for this simpler way. In every academic discipline and institution, we live today with questions for which our expertise provides no answers. At the turn of the century, physicists faced the same unnerving confusion. There is a frequently told story about Niels Bohr and Werner Heisenberg, two founders of quantum theory. This version is from *The Turning Point*:

> In the twentieth century, physicists faced, for the first time, a serious challenge to their ability to understand the universe. Every time they asked nature a question in an atomic experiment, nature answered with a paradox, and the more they tried to clarify the situation, the sharper the paradoxes became. In their struggle to grasp this new reality, scientists became painfully aware that their basic concepts, their language, and their whole way of thinking were inadequate to describe atomic phenomena. Their problem was not only intellectual but involved an intense emotional and existential experience, as vividly described by Werner Heisenberg: "I remember discussions with Bohr which went through many hours till very late at night and ended almost in despair; and when at the end of the

> discussion I went alone for a walk in the neighboring park I repeated to myself again and again the question: Can nature possibly be so absurd as it seemed to us in these atomic experiments?"
>
> It took these physicists a long time to accept the fact that the paradoxes they encountered are an essential aspect of atomic physics. . . . Once this was perceived, the physicists began to learn to ask the right questions and to avoid contradictions . . . and finally they found the precise and consistent mathematical formulation of [quantum] theory.
>
> . . . Even after the mathematical formulation of quantum theory was completed, its conceptual framework was by no means easy to accept. Its effect on the physicists' view of reality was truly shattering. The new physics necessitated profound changes in concepts of space, time, matter, object, and cause and effect; and because these concepts are so fundamental to our way of experiencing the world, their transformation came as a great shock. To quote Heisenberg again: "The violent reaction to the recent development of modern physics can only be understood when one realizes that here the foundations of physics have started moving; and that this motion has caused the feeling that the ground would be cut from science." (Capra 1983, 76–77)

For the past several years, I have found myself often relating this story to groups of people in organizations everywhere. The story speaks with a chilling familiarity. Each of us recognizes the feelings this tale describes, of being mired in the habit of solutions that once worked yet that are now totally inappropriate, of having rug after rug pulled from beneath us, whether by a corporate merger, reorganization, downsizing, or personal disorientation. But the story also gives great hope as a parable teaching us to embrace our despair as a step on the road to wisdom, encouraging us to sit in the unfamiliar seat of not knowing and open ourselves to radically new ideas. If we bear the

confusion, then one day, the story promises, we will begin to see a whole new land, one of bright illumination that will dispel the oppressive shadows of our current ignorance. I still tell Heisenberg's story. It never fails to speak to me from this deep place of reassurance.

I believe that we have only just begun the process of discovering and inventing the new organizational forms that will inhabit the twenty-first century. To be responsible inventors and discoverers, we need the courage to let go of the old world, to relinquish most of what we have cherished, to abandon our interpretations about what does and doesn't work. We must learn to see the world anew. As Einstein is often quoted as saying: No problem can be solved from the same consciousness that created it.

There are many places to search for new answers in a time of paradigm shifts. For me, it was appropriate that my inquiry led back to the natural sciences, reconnecting me to an earlier vision of myself. At fourteen, I aspired to be a space biologist and carried heavy astronomy texts on the New York subway to weekly classes at the Hayden Planetarium. These texts were far too dense for me to understand, but I carried them anyway because they looked so impressive. My abilities in biology were better founded, and I began college majoring in biology, but my encounters with advanced chemistry ended that career, and I turned to the greater ambiguity of the social sciences. Like many social scientists, I am at heart a lapsed scientist, still hoping the world will yield up its secrets to me.

But my focus on science is more than a personal interest. Each of us lives and works in organizations designed from Newtonian images of the universe. We manage by separating things into parts, we believe that influence occurs as a direct result of force exerted from one person to another, we engage in complex planning for a world that we keep expecting to be predictable, and we search continually for better methods of objectively measuring and perceiving the world. These assumptions, as I explain in Chapter Two, come to us from seventeenth-century physics, from Newtonian mechanics. They are the basis

from which we design and manage organizations, and from which we do research in all of the social sciences. Intentionally or not, we work from a world view that is strongly anchored in the natural sciences.

But the science has changed. If we are to continue to draw from science to create and manage organizations, to design research, and to formulate ideas about organizational design, planning, economics, human motivation, and change processes (the list can be much longer), then we need to at least ground our work in the science of our times. We need to stop seeking after the universe of the seventeenth century and begin to explore what has become known to us during the twentieth century. We need to expand our search for the principles of organization to include what is presently known about how the universe organizes.

The search for the lessons of new science is still in progress, really in its infancy; but what I hope to convey in these pages is the pleasure of sensing those first glimmers of a new way of thinking about the world and its organizations. The light may be dim, but its potency grows as the door cracks wider and wider. Here there are scientists who write about natural phenomena with a poetry and a clarity that speak to dilemmas we find in organizations. Here there are new images and metaphors for thinking about our own organizational experiences. This is a world of wonder and not knowing, where many scientists are as awestruck by what they see as were the early explorers who marveled at new continents. In this realm, there is a new kind of freedom, where it is more rewarding to explore than to reach conclusions, more satisfying to wonder than to know, and more exciting to search than to stay put. Curiosity, not certainty, becomes the saving grace.

This is not a book filled with conclusions, cases, or exemplary practices. It is deliberately *not* that kind of book, for two reasons. First, I don't believe that organizations are ever changed by imposing a model developed elsewhere. So little transfers to, or inspires, those trying to work at change in their own

organizations. In every organization, we need to look internally, to see one another as the critical resources on this voyage of discovery. We need to learn how to engage the creativity that exists everywhere in our organizations. Second, the new physics cogently explains that there is no objective reality out there waiting to reveal its secrets. There are no recipes or formulas, no checklists or expert advice that describe "reality." If context is as crucial as the science explains, then nothing really transfers; everything is always new and different and unique to each of us. We must engage with each other, experiment to find what works for us, and support one another as the true inventors that we are.

This book attempts to be true to that new vision of reality, where ideas and information are but half of what is required to evoke reality. The creative possibilities of the ideas represented here depend on your engagement with them. I assigned myself the task of presenting material to provoke and engage you, knowing that your experience with these pages will produce different ideas, different hopes, and different experiments than mine. It is not important that we agree on one expert interpretation or one best practice. That is not the nature of the universe in which we live. We inhabit a world that co-evolves as we interact with it. This world is impossible to pin down, constantly changing, and infinitely more interesting than anything we ever imagined.

Though the outcomes to be gained from reading this book are unique to each of you, the ideas I have chosen to think about focus on the meta-issues that concern those of us who work in organizations: Where is order to be found? How do complex systems change? How do we create structures that are flexible and adaptive, that enable rather than constrain? How do we simplify things without losing what we value about complexity? How do we resolve personal needs for autonomy and growth with organizational needs for prediction and accountability?

The new science research referred to in this book comes from the disciplines of physics, biology, and chemistry, and from theories of evolution and chaos that span several disciplines. Each chapter inquires into metaphorical links between certain scientific perspectives and organizational phenomena, but it may be useful first to say something about the direction of new science.

Scientists in many different disciplines are questioning whether we can adequately explain how the world works by using the machine imagery emphasized in the seventeenth century by such great geniuses as Sir Isaac Newton and René Descartes. This machine imagery leads to the belief that studying the parts is the key to understanding the whole. Things are taken apart, dissected literally or figuratively (as we have done with business functions, academic disciplines, areas of specialization, human body parts), and then put back together without any significant loss. The assumption is that the more we know about the workings of each piece, the more we will learn about the whole.

Newtonian science is also materialistic—it seeks to comprehend the world by focusing on what can be known through our physical senses. Anything *real* has visible and tangible physical form. In the history of physics and even to this day, many scientists keep searching for the basic "building blocks" of matter, the physical forms from which everything originates.

One of the first differences between new science and Newtonianism is a focus on holism rather than parts. Systems are understood as whole systems, and attention is given to *relationships within those networks.* Donella Meadows, an ecologist and author, quotes an ancient Sufi teaching that captures this shift in focus: "You think because you understand *one* you must understand *two,* because one and one makes two. But you must also understand *and*" (1982, 23). When we view systems from this perspective, we enter an entirely new landscape of connections, of phenomena that cannot be reduced to simple cause and effect, or explained by studying the parts as isolated contributors. We move into a land where it becomes critical to sense the constant workings of

dynamic processes, and then to notice how these processes materialize as visible behaviors and forms.

Explorations into the subatomic world began early in this century, creating the dissonance described in Heisenberg's story. In physics, therefore, the search for radically new models now has a long and somewhat strange tradition. The strangeness lies in the pattern of discovery that characterized many of the major discoveries in quantum mechanics: "A lucky guess based on shaky arguments and absurd ad hoc assumptions gives a formula that turns out to be right, though at first no one can see why on earth it should be" (March 1978, 3). I delight in that statement of scientific process. It gives me hope that we might all approach discovery differently, hope that we can move away from the plodding, deadening character of so many research and planning activities.

The quantum mechanical view of reality startles us out of common notions of what is real. Even to scientists, it is admittedly bizarre. In the quantum world, *relationship* is the key determiner of everything. Subatomic particles come into form and are observed only as they are in relationship to something else. They do not exist as independent "things." There are no basic "building blocks." Quantum physics paints a strange yet enticing view of a world that, as Heisenberg characterized it, "appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole" (1958, 107). These unseen *connections* between what were previously thought to be separate entities are the fundamental ingredient of all creation.

In other disciplines, especially biology, nonmechanistic models are only beginning to be replaced by more holistic, dynamic ones. Traditional mechanistic thinking still prevails in the field of molecular biology and most work in genetics. But many scientists now seek to understand *life as life,* moving away from machine imagery. For example, in *The Web of Life* (1996), Fritjof Capra presents a new synthesis of the science of living systems, drawing

together scientific discoveries and theories from many branches of science. Capra's synthesis reveals processes that are startlingly different from the mechanistic ones that had been used to explain life.

Similar shifts in understanding have appeared in the field of human health. In holistic treatments, the body is viewed as an integrated system rather than as a collection of discrete parts. Some biologists offer the perspective that what we thought of as discrete systems (such as the immune, endocrine, and neurological systems) are better understood as one system, totally interdependent in their functioning (see Pert and Chopra 1997).

And at the grandest level of scale, looking at the earth as a whole, is the Gaia theory, first proposed by James Lovelock. There is increasing support for his hypothesis that the earth is a self-regulating system, a planetary community of interdependent systems that together create the conditions which make life possible (see Lovelock 1988, Margulis 1998).

In biology, so many fundamental reformulations of prevailing theories are occurring—in evolution, animal behavior, ecology, physiology—that Ernst Mahr, a noted chronicler of biological thought, stated that a new philosophy of biology is needed (1988). What is being sought, comments biologist Steven Rose, is a biology that is more holistic and integrative, a "science that is adult enough to rejoice in complexity" (1997, 133).

In chemistry, Ilya Prigogine won the Noble Prize in 1977 for work that demonstrates how certain chemical systems reorganize themselves into greater *order* when confronted with changes in their environment. In the older, mechanistic models of systems, change and disturbances signaled trouble. These disruptions would only speed up the inevitable decline that was the fate of all systems. But Prigogine's work offered a new and more promising future. He demonstrated that any open system has the capacity to respond to change and disorder by reorganizing itself at a higher level of organization. Disorder becomes a critical player, an ally that can provoke a system to self-organize into

new forms of being. As we leave behind the machine model of life and look more deeply into the dynamics of living systems, we begin to glimpse an entirely new way of understanding fluctuations, disorder, and change.

New understandings of change and disorder have also emerged from chaos theory. Work in this field has led to a new appreciation of the relationship between order and chaos. These two forces are now understood as mirror images, two states that contain the other. A system can descend into chaos and unpredictability, yet within that state of chaos the system is held within boundaries that are well-ordered and predictable. Without the partnering of these two great forces, no change or progress is possible. Chaos is necessary to new creative ordering. This revelation has been known throughout time to most human cultures; we just needed the science to help us remember it.

New science is also making us more aware that our yearning for freedom and simplicity is one we share with all life. In many examples, scientists now describe how order and form are created not by complex controls, but by the presence of a few guiding formulas or principles repeating back on themselves through the exercise of individual freedom. The survival and growth of systems that range in size from large ecosystems down to the smallest microbial colonies are sustained by a few key principles that express the system's overall identity combined with high levels of autonomy for individuals within that system.

The world described by new science is changing our beliefs and perceptions in many areas, not just those of science. New science ideas have crept into almost every discipline, including my own field of organizational theory. I can see the influence of science if I look at those problems that plague us most in organizations and how we are reformulating them. Leadership, an amorphous phenomenon that has intrigued us since people began organizing, is being examined now for its relational aspects. Few if any theorists ignore the complexity of relationships that contribute to a leader's effectiveness. Instead,

there are more and more studies on partnership, followership, empowerment, teams, networks, and the role of context.

Relational issues appear everywhere I look. Ethical and moral questions are no longer fuzzy religious concepts but key elements in the relationship any organization has with colleagues, stakeholders, and communities. At the personal level, many authors write now on our interior relationship with our spirit, soul, and life's purpose. Ecological writers stress the relationship that exists not only between us and all beings in our environment, but between us and future generations. If the physics of our time is revealing the primacy of relationships, is it any wonder that we are beginning to rethink our major issues in more relational terms?

In motivation theory, attention is shifting from the use of external rewards to an appreciation for the intrinsic motivators that give us great energy. We are refocusing on the deep longings we have for community, meaning, dignity, purpose, and love in our organizational lives. We are beginning to look at the strong emotions of being human, rather than segmenting ourselves by believing that love doesn't belong at work, or that feelings are irrelevant in the organization. There are many attempts to leave behind the view that predominated in the twentieth century, when we believed that organizations could succeed by confining workers to narrow roles and asking only for very partial contributions. As we let go of the machine model of organizations, and workers as replaceable cogs in the machinery of production, we begin to see ourselves in much richer dimensions, to appreciate our wholeness, and, hopefully, to design organizations that honor and make use of the great gift of who we humans are.

The impact of vision, values, and culture occupies a great deal of organizational attention. We see their effects on organizational vitality, even if we can't define why they are such potent forces. We now sense that some of the best ways to create continuity and congruence in the midst of turbulent times

are through the use not of controls, but of forces that are invisible yet palpable. Many scientists now work with the concept of fields—invisible forces that occupy space and influence behavior. I have played with the notion that organizational vision and values act like fields, unseen but real forces that influence people's behavior. This is quite different from more traditional notions that vision is an evocative message about some desired future state delivered by a charismatic leader.

Our concept of organizations is moving away from the mechanistic creations that flourished in the age of bureaucracy. We now speak in earnest of more fluid, organic structures, of boundaryless and seamless organizations. We are beginning to recognize organizations as whole systems, construing them as "learning organizations" or as "organic" and noticing that people exhibit self-organizing capacity. These are our first journeys that signal a growing appreciation for the changes required in today's organizations. My own experience suggests that we can forego the despair created by such common organizational events as change, chaos, information overload, and entrenched behaviors if we recognize that organizations are living systems, possessing the same capacity to adapt and grow that is common to all life.

Some believe that there is a danger in playing with science and abstracting its metaphors because, after a certain amount of stretch, the metaphors lose their relationship to the tight scientific theories that gave rise to them. But others would argue that all science is metaphor, a hypothetical description of how to think of a reality we can never fully know. In seeking to play with the rich images coming out of new science, I share the sentiments of physicist Frank Oppenheimer: "If one has a new way of thinking, why not apply it wherever one's thought leads to? It is certainly entertaining to let oneself do so, but it is also often very illuminating and capable of leading to new and deep insights" (Cole 1985, 2).

Chapter 1

Discovering an Orderly World

It has taken us a long while to get here—a nine-mile hike up a gradual ascent over rocky paths. My horse, newly trained to pack equipment and still an amateur, has bumped against my back, bruised my heels, and finally, unavoidably, stepped on my toe, smashing it against the inside of my boot. But it's been worth it. Here are the American Rockies at their clichéd best. The stream where I sit soaking my feet glistens on for miles I can't see, into green grasses that bend to the wind. There are pine trees, mountains, hawks, and off at the far edge of the meadow a moose who sees us and moves to hide her great girth behind a tree that is only four inches wide. The tree extends just to the edge of each eyeball. We laugh, but I suspect there's a lesson in it for all of us.

For months, I have been studying process structures—things that sustain their identity over time yet are not locked rigidly into any one physical form. This stream that swirls around my feet is the most beautiful one I've encountered. Because it is vacation, I resist thinking too deeply about this stream, but as I relax into its flow, images stir and gently whorl the surface.

Finally, I ask directly: What is it that streams can teach me about organizations? I am attracted to the diversity I see, to these swirling combinations of mud, silt, grass, water, rocks. This stream has an impressive ability to adapt, to change the configurations, to let the power shift, to create

new structures. But behind this adaptability, making it all happen, I think, is the water's need to flow. Water answers to gravity, to downhill, to the call of ocean. The forms change, but the mission remains clear. Structures emerge, but only as temporary solutions that facilitate rather than interfere. There is none of the rigid reliance that I have learned in organizations on single forms, on true answers, on past practices. Streams have more than one response to rocks; otherwise, there'd be no Grand Canyon. Or Grand Canyons everywhere. The Colorado river realized there were many ways to find ocean other than by staying broad and expansive.

Organizations lack this kind of faith, faith that they can accomplish their purposes in varied ways and that they do best when they focus on intent and vision, letting forms emerge and disappear. We seem hypnotized by structures, and we build them strong and complex because they must, we believe, hold back the dark forces that threaten to destroy us. It's a hostile world out there, and organizations, or we who create them, survive only because we build crafty and smart—smart enough to defend ourselves from the natural forces of destruction. Streams have a different relationship with natural forces. With sparkling confidence, they know that their intense yearning for ocean will be fulfilled, that nature creates not only the call, but the answer.

Many of the organizations I experience are impressive fortresses. The language of defense permeates them: in CYA memo-madness; in closely guarded secrets and locked personnel files; in activities defined as "campaigns," "skirmishes," "wars," "turf battles," and the ubiquitous phrases of sports that describe everything in terms of offense and defense. Many organizations feel they have to defend themselves even against their employees with regulations, guidelines, time clocks, and policies and procedures for every eventuality. One organization I worked in welcomed its new employees with a list of twenty-seven offenses for which they could be summarily fired—and the assurance that they could be fired for other reasons as well. Some organizations have rigid

chains of command to keep people from talking to anyone outside their department, and in most companies, protocols define who can be consulted, advised, or criticized. We are afraid of what would happen if we let these elements of the organization recombine, reconfigure, or speak truthfully to one another. We are afraid that things will fall apart.

This need to hold the world together, these experiences of fright and fragility, are so pervasive that I wondered about the phenomenon long before I came upon this teacher stream. Fear that is everywhere must come to us from somewhere. But where? In modern Western thought, I believe one source is our fuzzy understanding of concepts that gained strength from seventeenth-century science. Three centuries ago, when the world was imagined as an exquisite machine set in motion by God—a closed system with a watchmaker father who then left the shop—the concept of entropy entered our collective consciousness. Machines wear down; they eventually stop. In the poet Yeats' phrase, "Things fall apart; the center cannot hold, mere anarchy is loosed upon the world." This is a universe, we feel, that cannot be trusted with its own processes for growth and rejuvenation. If we want progress, then we must provide the energy to reverse decay. By sheer force of will, because we are the planet's intelligence, we will make the world work. We will resist death.

What a fearful posture this has been! Something Atlas only imagined, it has gone on so long. It is time to stop now. It is time to take the world off our shoulders, to lay it gently down and look to it for an easier way. It is not only streams that have something to teach us. Lessons are everywhere. But the question is key. If not with us, then where are the sources of order to be found?

I believe nature offers abundant displays of order and clear lessons for how to achieve it. Despite the experience of fluctuations and changes that disrupt our plans, the world is inherently orderly. It continues to create systems of great scope, capacity, and diversity. And fluctuation and change are essential to the process by which order is created.

Life is about creation. This ability of life to create itself is captured in a strange-sounding new word, *autopoiesis* (from Greek, meaning self-production or self-making). Autopoiesis is life's fundamental process for creating and renewing itself, for growth and change. A living system is a network of processes in which every process contributes to all other processes. The entire network is engaged together in producing itself (Capra 1996, 99). This process is not limited to one type of organism—it describes life itself. As described by systems scientist Erich Jantsch, any living system is "a never resting structure that constantly seeks its own self-renewal" (1980, 10). And this description defines a paradox that is important to note when we think about change: A living system produces itself; it will change in order to preserve that self. Change is prompted only when an organism decides that changing is the only way to maintain itself.

There is another important paradox in living systems: Each organism maintains a clear sense of its individual identity *within* a larger network of relationships that helps shape its identity. Each being is noticeable as a separate entity, yet it is simultaneously part of a whole system. While we humans observe and count separate selves, and pay a great deal of attention to the differences that seem to divide us, in fact we survive only as we learn how to participate in a web of relationships. Autopoiesis describes a very different universe, one in which all organisms are capable of creating a "self" through their intimate engagement with all others in their system. This is not a fragile, fragmented world that needs us to hold it together. This is a world rich in processes that support growth and coherence through paradoxes that we need to contemplate.

In chemistry, Ilya Prigogine's prize-winning work also teaches a paradoxical truth, that disorder can be the source of new order. Prigogine coined the term "dissipative structures" for these newly discovered systems to describe their contradictory nature. Dissipation describes loss, a process of energy gradually

ebbing away, while structure describes embodied order. Prigogine discovered that the dissipative activity of loss was necessary to create new order. Dissipation didn't lead to the death of a system. It was part of the process by which the system let go of its present form so that it could reorganize in a form better suited to the demands of its changed environment.

Prigogine's work has helped explain a long-standing contradiction of Western science. If, as science believed, entropy is the rule, then why does life flourish? Why does life result in newness and evolution, not deterioration and disintegration?

In a dissipative structure, anything that disturbs the system plays a crucial role in helping it self-organize into a new form of order. Whenever the environment offers new and different information, the system chooses whether to accept that provocation and respond. This new information might be only a small difference from the norm. But if the system pays attention to this information, it brings the information inside, and once inside that network, the information grows and changes. If the information becomes such a large disturbance that the system can no longer ignore it, then real change is at hand. At this moment, jarred by so much internal disturbance and far from equilibrium, the system will fall apart. In its current form, it cannot deal with the disturbance, so it dissolves. But this disintegration does not signal the death of the system. If a living system can maintain its identity, it can self-organize to a higher level of complexity, a new form of itself that can deal better with the present.

In this way, dissipative structures demonstrate that *disorder* can be a source of new *order*, and that growth appears from disequilibrium, not balance. The things we fear most in organizations—disruptions, confusion, chaos—need not be interpreted as signs that we are about to be destroyed. Instead, these conditions are necessary to awaken creativity. Scientists in this newly understood world describe the relation of disorder to order as "order out of

chaos" or "order through fluctuation" (Prigogine and Stengers, 1984). These are new principles that highlight the dynamics between chaos and creativity, between disruption and growth.

At the quantum level of reality, the paradoxes grow even larger. At the subatomic level, change happens in jumps, beyond any power of precise prediction. Quantum physicists speak in terms of probabilities, not prediction. They can calculate the probable moment and location of a quantum leap, but not exactly. Newtonian physics operates with a different belief—that the world *does* behave in deterministic ways. (This assumption has been challenged by Prigogine's recent work; see 1998.)

The quantum world also challenges beliefs about objective measurement, for at the subatomic level the observer cannot observe anything without interfering or, more precisely, participating in its creation. The strange qualities of the quantum world have shaken prevailing scientific beliefs in determinism, predictability, and control. At first glance then, quantum physics doesn't seem to volunteer concepts that aid us in our search for a more orderly universe. But the impossibility of exact predictions at the quantum level is not a result of inherent disorder. Instead, the behaviors observed are a result of quantum interconnectedness, of a deep and intimate order. There is a constant weaving of relationships, of energies that merge and change, of momentary ripples that become noticeable within a seamless fabric. There is so much order that our attempts to separate out discrete events create the appearance of disorder.

Order has been found even in the event that historically has meant absolute disorder—chaos. Chaos theory has given us images of "strange attractors"—computer-generated pictures of swirling motion that trace the evolution of a system. A system is defined as chaotic when it becomes impossible to know what it will do next. The system never behaves the same way twice. But as chaos theory shows, if we look at such a system over time, it demonstrates an inherent orderliness. Its wild gyrations are held within an invisible boundary.

The system holds order within it, and reveals this self-portrait as a beautiful pattern, its strange attractor (see the color section and page 117).

Throughout the universe, then, order exists within disorder and disorder within order. We have always thought that disorder was the absence of the natural state of order, seen in the word itself: dis-order. But do we believe this? Is chaos an irregularity, or is order just a lucky moment grabbed from natural disorder? We've been taught to see things as separate states: One needs to be normal, the other exceptional. Yet as we move into this new territory where paradox is a distinguishing feature, we can see that what is happening is a dance—of chaos and order, of change and stability. Just as in the timeless image of yin and yang, we are dealing with complementarities that only look like polarities. Neither one is primary; both are absolutely necessary. When we observe growth, we observe the results of the dance.

One systems scientist said that a system is *a set of processes* that are made visible in temporary structures. These living structures are in no way similar to the solid structures we build. The structures of life are transient; they are capable of changing if needed: "Caterpillar and butterfly, for example, are two temporarily stabilized structures in the coherent evolution of one and the same system" (Jantsch 1980, 6). The system continues to develop, to release itself from the old and find new structures as they are required.

While we have lusted for order in organizations, we have failed to understand where to find it. We have seen order reflected in the structures we build, whether they be bright mirror-glass buildings, dazzling charts, or plans begun on paper napkins. These structures take so much time, creativity, and attention that it is hard not to want them to be permanent. It is hard to welcome disorder as a full partner in the search for order when we have expended so much effort to bar it from the gates. I find myself challenged by this new land of evolving form, of structures that come and go, of bearings gained not from the rigid artifacts of organization charts and job descriptions, but from directions arising out

of deep, natural processes of growth and self-renewal. This is not an easy land to inhabit, not an easy world in which to place faith, except that we're already living with the evidence that supports it—this wonderfully diverse and creative planet. And all of us, even in rigid organizations, have experienced self-organization, times when we recreate ourselves, not according to some idealized plan, but because the environment demands it. We let go of our old form and figure out how best to organize ourselves in new ways.

When I think about the work experiences I cherish most, I see such self-organization. In the interest of getting things done, our roles and tasks moved with such speed that they blurred to nothing. We were too engaged with the work to worry about defining accountabilities or roles. We all felt accountable for figuring out what worked and implementing it quickly. When people speak of informal leadership, they describe a similar experience—how people create the leadership that best responds to their needs at the time. We may fail to honor these leaders more formally, trapped as we are in our beliefs about hierarchy and power, but we always know who the real leader is and why we are willing to follow. Max De Pree, former CEO of Herman Miller, calls this "roving leadership, the indispensable people in our lives who are there when we need them" (1989, 41–42). They emerge from the group, not by self-assertion, but because they make sense, given what the group and individuals need so that they can survive and grow. Organization consultant Jill Janov states that leadership is best thought of as a behavior, not a role. We always need leaders, but this need can be satisfied by many different people, depending on the context (Janov 1994).

All this time, we have created trouble for ourselves in organizations by confusing control with order. This is no surprise, given that for most of its written history, leadership has been defined in terms of its control functions. Lenin spoke for many leaders when he said: "Freedom is good, but control is

better." And our quest for control has been oftentimes as destructive as was his.

If people are machines, seeking to control us makes sense. But if we live with the same forces intrinsic to all other life, then seeking to impose control through rigid structures is suicide. If we believe that there is no order to human activity except that imposed by the leader, that there is no self-regulation except that dictated by policies, if we believe that responsible leaders must have their hands into everything, controlling every decision, person, and moment, then we cannot hope for anything except what we already have—a treadmill of frantic efforts that end up destroying our individual and collective vitality.

What if we could reframe the search? What if we stopped looking for control and began, in earnest, the search for order? Order we will find in places we never thought to look before—all around us in nature's living, dynamic systems. In fact, once we begin to look into nature with new eyes, the teachers are everywhere.

I looked again at the moose, staring intently into that narrow beam of tree. Our search for safety, our belief that we can control our organizations by the structures we impose, is no less foolish. As long as we stare cross-eyed at that tree, we can't see all around us the innate processes of living systems that are there to help create the order we crave.

Yet it is hard to step away from that tree. It is hard to open ourselves to a world of inherent orderliness. "In life, the issue is not control, but dynamic connectedness," Jantsch writes (1980, 196). I want to act from that knowledge. I want to trust in this universe so much that I give up playing God. I want to stop struggling to hold things together. I want to experience such security that the concept of "allowing"—trusting that the appropriate forms will emerge—ceases to be scary. I want to surrender my fear of the universe and join with everyone I know in an organization that opens willingly to its environment, participating gracefully in the unfolding dance of order.

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