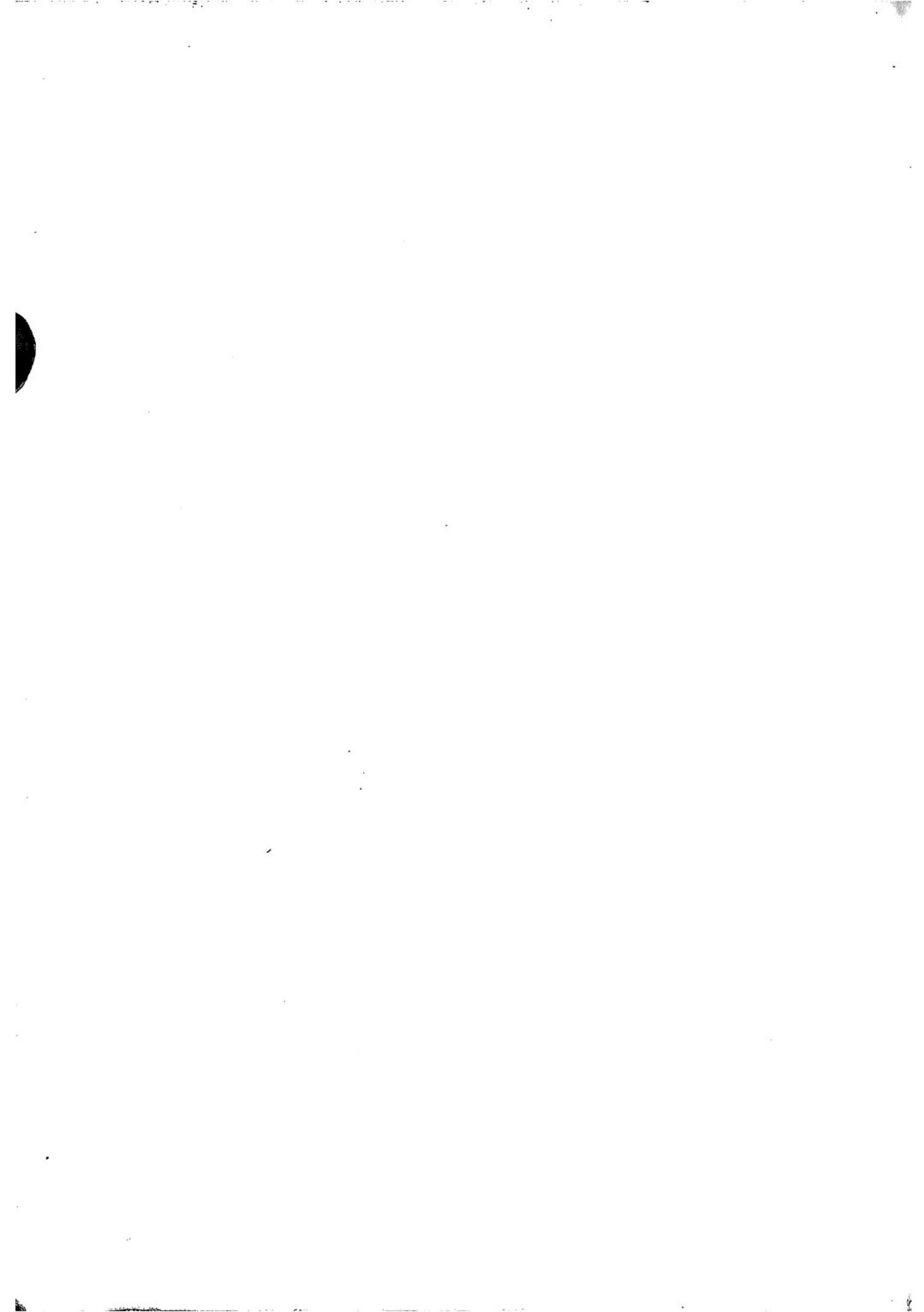


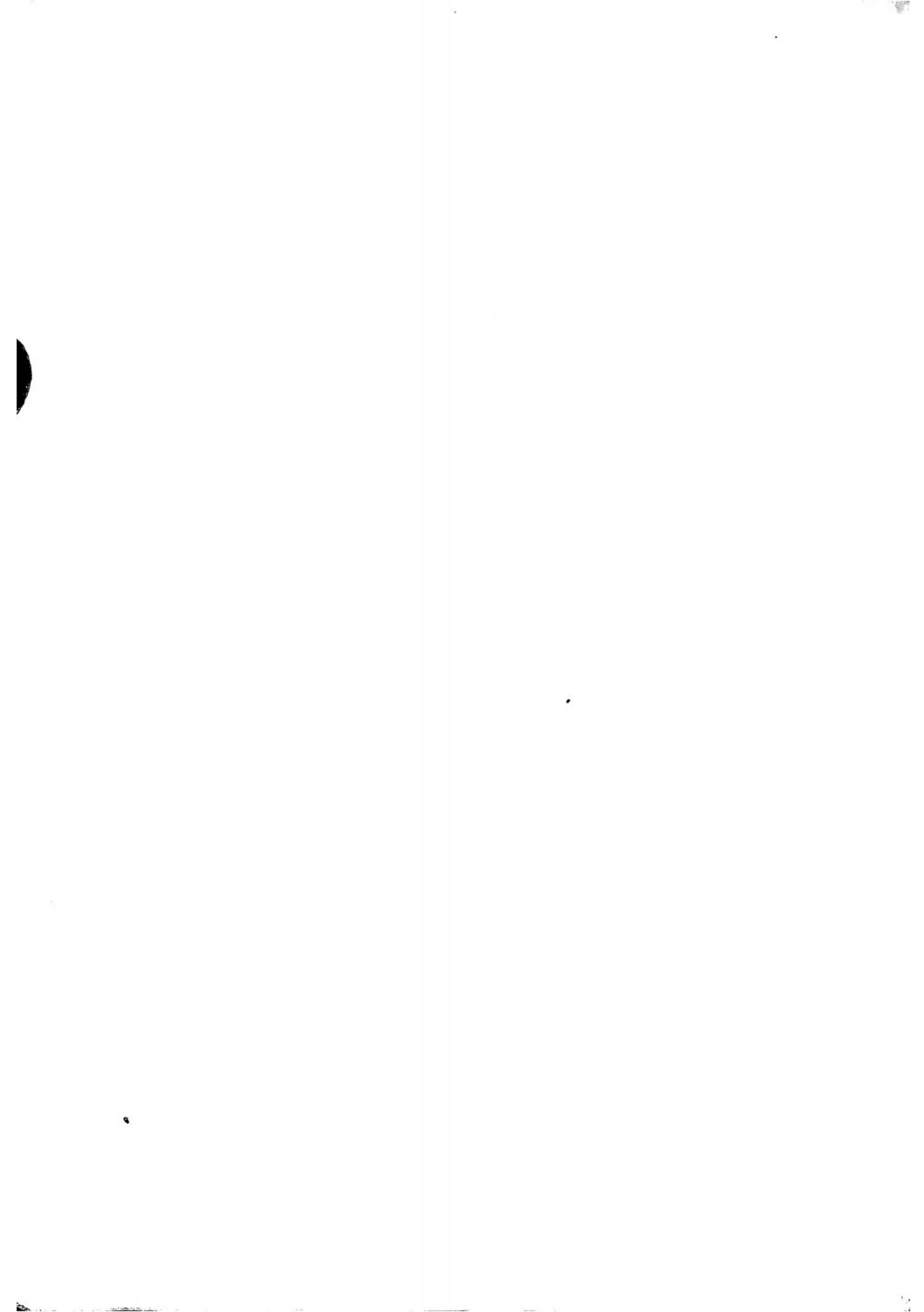
# THE TAO OF PHYSICS

*by Fritjof Capra*





THE  
TAO  
OF  
PHYSICS



# THE TAO OF PHYSICS

*An Exploration of the Parallels  
Between Modern Physics  
and Eastern Mysticism*

*by Fritjof Capra*



Shambhala  
*Boulder • 1975*



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I dedicate this book to  
Ali Akbar Khan  
Carlos Castaneda  
Geoffrey Chew  
John Coltrane  
Werner Heisenberg  
Krishnamurti  
Liu Hsiu Ch'i  
Phiroz Mehta  
Jerry Shesko  
Bobby Smith  
Maria Teuffenbach  
Alan Watts  
for helping me to find my path  
and to Jacqueline  
who has travelled with me  
on this path  
most of the time.

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It is probably true quite generally that in the history of human thinking the most fruitful developments frequently take place at those points where two different lines of thought meet. These lines may have their roots in quite different parts of human culture, in different times or different cultural environments or different religious traditions: hence if they actually meet, that is, if they are at least so much related to each other that a real interaction can take place, then one may hope that new and interesting developments may follow.

*Werner Heisenberg*

# PREFACE

Five years ago, I had a beautiful experience which set me on a road that has led to the writing of this book. I was sitting by the ocean one late summer afternoon, watching the waves rolling in and feeling the rhythm of my breathing, when I suddenly became aware of my whole environment as being engaged in a gigantic cosmic dance. Being a physicist, I knew that the sand, rocks, water and air around me were made of vibrating molecules and atoms, and that these consisted of particles which interacted with one another by creating and destroying other particles. I knew also that the Earth's atmosphere was continually bombarded by showers of 'cosmic rays', particles of high energy undergoing multiple collisions as they penetrated the air. All this was familiar to me from my research in high-energy physics, but until that moment I had only experienced it through graphs, diagrams and mathematical theories. As I sat on that beach my former experiences came to life; I 'saw' cascades of energy coming down from outer space, in which particles were created and destroyed in rhythmic pulses; I 'saw' the atoms of the elements and those of my body participating in this cosmic dance of energy; I felt its rhythm and I 'heard' its sound, and at that moment I knew that this was the Dance of Shiva, the Lord of Dancers worshipped by the Hindus.

I had gone through a long training in theoretical physics and had done several years of research. At the same time, I had become very interested in Eastern mysticism and had begun to see the parallels to modern physics. I was particularly attracted to the puzzling aspects of Zen which reminded me of the puzzles in quantum theory. At first, however, relating

the two was a purely intellectual exercise. To overcome the gap between rational, analytical thinking and the meditative experience of mystical truth, was, and still is, very difficult for me.

In the beginning, I was helped on my way by 'power plants' which showed me how the mind can flow freely; how spiritual insights come on their own, without any effort, emerging from the depth of consciousness. I remember the first such experience. Coming, as it did, after years of detailed analytical thinking, it was so overwhelming that I burst into tears, at the same time, not unlike Castaneda, pouring out my impressions on to a piece of paper.

Later came the experience of the Dance of Shiva which I have tried to capture in the photomontage shown on page 224. It was followed by many similar experiences which helped me gradually to realize that a consistent view of the world is beginning to emerge from modern physics which is harmonious with ancient Eastern wisdom. I took many notes over the years, and wrote a few articles about the parallels I kept discovering, until I finally summarized my experiences in the present book.

This book is intended for the general reader with an interest in Eastern mysticism who need not necessarily know anything about physics. I have tried to present the main concepts and theories of modern physics without any mathematics and in non-technical language, although a few paragraphs may still appear difficult to the layperson at first reading. The technical terms I had to introduce are all defined where they appear for the first time and are listed in the index at the end of the book.

I also hope to find among my readers many physicists with an interest in the philosophical aspects of physics, who have as yet not come in contact with the religious philosophies of the East. They will find that Eastern mysticism provides a consistent and beautiful philosophical framework which can accommodate our most advanced theories of the physical world.

As far as the contents of the book are concerned, the reader may feel a certain lack of balance between the presentation of scientific and mystical thought. Throughout the book, his or her understanding of physics should progress steadily, but a

comparable progression in the understanding of Eastern mysticism may not occur. This seems unavoidable, as mysticism is, above all, an experience that cannot be learned from books. A deeper understanding of any mystical tradition can only be felt when one decides to become actively involved in it. All I can hope to do is to generate the feeling that such an involvement would be highly rewarding.

During the writing of this book, my own understanding of Eastern thought has deepened considerably. For this I am indebted to two men who come from the East. I am profoundly grateful to Phiroz Mehta for opening my eyes to many aspects of Indian mysticism, and to my T'ai Chi master Liu Hsiu Ch'i for introducing me to living Taoism.

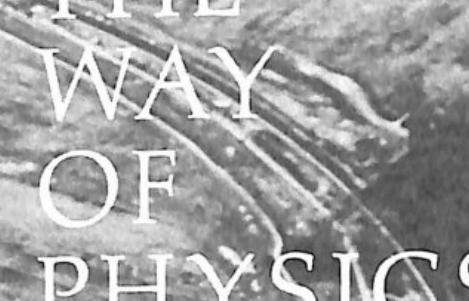
It is impossible to mention the names of everyone—scientists, artists, students, and friends—who have helped me formulate my ideas in stimulating discussions. I feel, however, that I owe special thanks to Graham Alexander, Jonathan Ashmore, Stratford Caldecott, Lyn Gambles, Sonia Newby, Ray Rivers, Joël Scherk, George Sudarshan, and—last but not least—Ryan Thomas.

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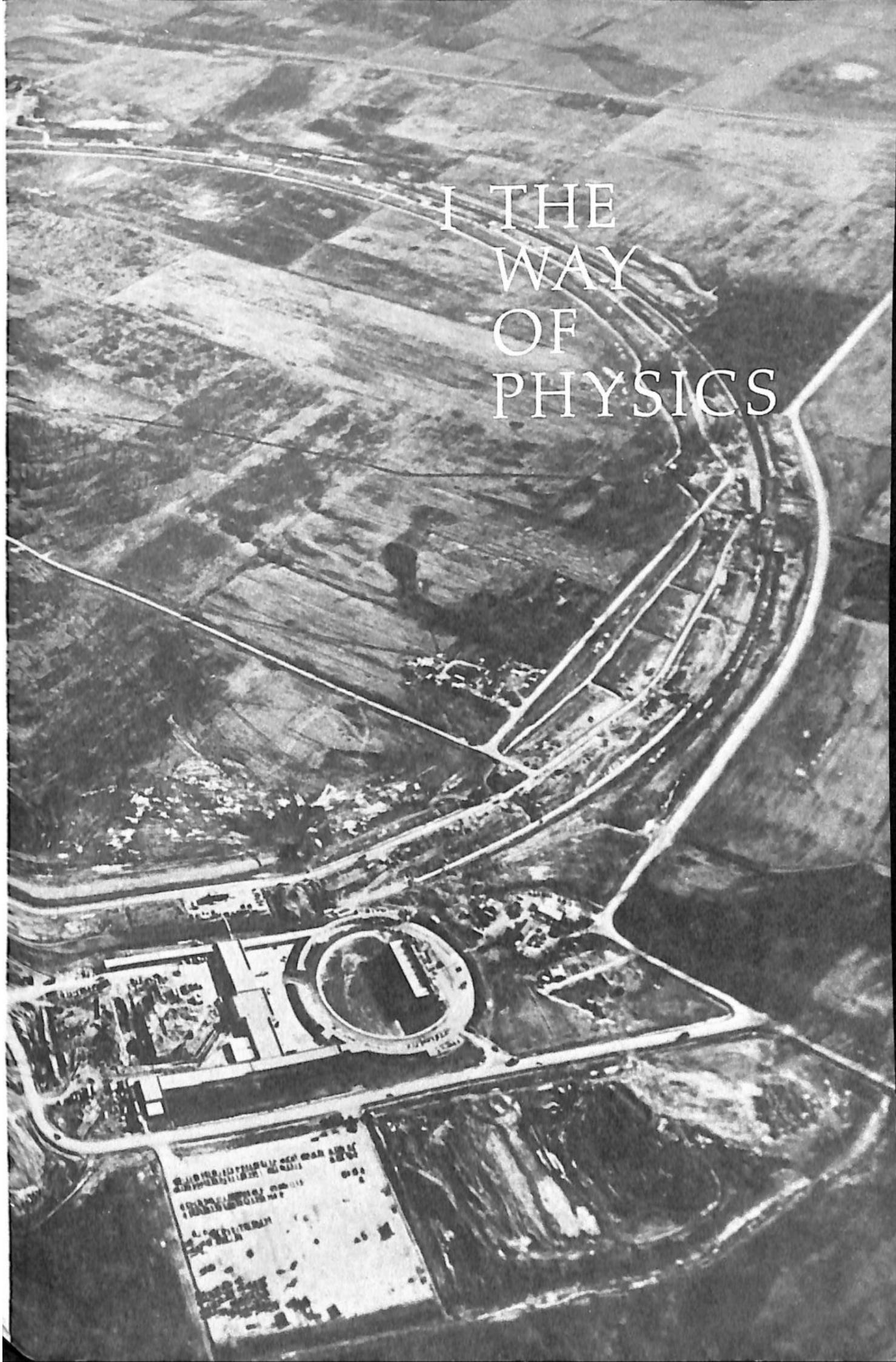
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*Fritjof Capra*





# I THE WAY OF PHYSICS



Any path is only a path, and there is no affront, to oneself or to others, in dropping it if that is what your heart tells you ... Look at every path closely and deliberately. Try it as many times as you think necessary. Then ask yourself, and yourself alone, one question ... Does this path have a heart? If it does, the path is good; if it doesn't it is of no use.

*Carlos Castaneda, The Teachings of Don Juan*

# 1 MODERN PHYSICS

## *A Path with a Heart?*

Modern physics has had a profound influence on almost all aspects of human society. It has become the basis of natural science, and the combination of natural and technical science has fundamentally changed the conditions of life on our earth, both in beneficial and detrimental ways. Today, there is hardly an industry that does not make use of the results of atomic physics, and the influence these have had on the political structure of the world through their application to atomic weaponry is well known. However, the influence of modern physics goes beyond technology. It extends to the realm of thought and culture where it has led to a deep revision in man's conception of the universe and his relation to it. The exploration of the atomic and subatomic world in the twentieth century has revealed an unsuspected limitation of classical ideas, and has necessitated a radical revision of many of our basic concepts. The concept of matter in subatomic physics, for example, is totally different from the traditional idea of a material substance in classical physics. The same is true for concepts like space, time, or cause and effect. These concepts, however, are fundamental to our outlook on the world around us and with their radical transformation our whole world view has begun to change.

These changes, brought about by modern physics, have been widely discussed by physicists and by philosophers over the past decades, but very seldom has it been realized that they all seem to lead in the same direction, towards a view of the world which is very similar to the views held in Eastern mysticism. The concepts of modern physics often show surprising parallels to the ideas expressed in the religious philo-

sophies of the Far East. Although these parallels have not, as yet, been discussed extensively, they have been noticed by some of the great physicists of our century when they came in contact with Far Eastern culture during their lecture tours to India, China and Japan. The following three quotations serve as examples:

The general notions about human understanding ... which are illustrated by discoveries in atomic physics are not in the nature of things wholly unfamiliar, wholly unheard of, or new. Even in our own culture they have a history, and in Buddhist and Hindu thought a more considerable and central place. What we shall find is an exemplification, an encouragement, and a refinement of old wisdom.<sup>1</sup>

*Julius Robert Oppenheimer*

For a parallel to the lesson of atomic theory ... [we must turn] to those kinds of epistemological problems with which already thinkers like the Buddha and Lao Tzu have been confronted, when trying to harmonize our position as spectators and actors in the great drama of existence.<sup>2</sup>

*Niels Bohr*

The great scientific contribution in theoretical physics that has come from Japan since the last war may be an indication of a certain relationship between philosophical ideas in the tradition of the Far East and the philosophical substance of quantum theory.<sup>3</sup>

*Werner Heisenberg*

The purpose of this book is to explore this relationship between the concepts of modern physics and the basic ideas in the philosophical and religious traditions of the Far East. We shall see how the two foundations of twentieth-century physics—quantum theory and relativity theory—both force us to see the world very much in the way a Hindu, Buddhist or Taoist sees it, and how this similarity strengthens when we look at the recent attempts to combine these two theories in order to describe the phenomena of the submicroscopic world: the properties and interactions of the subatomic particles of which all matter is made. Here the parallels between

modern physics and Eastern mysticism are most striking, and we shall often encounter statements where it is almost impossible to say whether they have been made by physicists or by Eastern mystics.

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When I refer to 'Eastern mysticism', I mean the religious philosophies of Hinduism, Buddhism and Taoism. Although these comprise a vast number of subtly interwoven spiritual disciplines and philosophical systems, the basic features of their world view are the same. This view is not limited to the East, but can be found to some degree in all mystically oriented philosophies. The argument of this book could therefore be phrased more generally, by saying that modern physics leads us to a view of the world which is very similar to the views held by mystics of all ages and traditions. Mystical traditions are present in all religions, and mystical elements can be found in many schools of Western philosophy. The parallels to modern physics appear not only in the *Vedas* of Hinduism, in the *I Ching*, or in the Buddhist *sutras*, but also in the fragments of Heraclitus, in the Sufism of Ibn Arabi, or in the teachings of the Yaqui sorcerer Don Juan. The difference between Eastern and Western mysticism is that mystical schools have always played a marginal role in the West, whereas they constitute the mainstream of Eastern philosophical and religious thought. I shall therefore, for the sake of simplicity, talk about the 'Eastern world view' and shall only occasionally mention other sources of mystical thought.

If physics leads us today to a world view which is essentially mystical, it returns, in a way, to its beginning, 2,500 years ago. It is interesting to follow the evolution of Western science along its spiral path, starting from the mystical philosophies of the early Greeks, rising and unfolding in an impressive development of intellectual thought that increasingly turned away from its mystical origins to develop a world view which is in sharp contrast to that of the Far East. In its most recent stages, Western science is finally overcoming this view and coming back to those of the early Greek and the Eastern philosophies. This time, however, it is not only based on intuition, but also on experiments of great precision and sophistication, and on a rigorous and consistent mathematical formalism.

The roots of physics, as of all Western science, are to be found in the first period of Greek philosophy in the sixth century B.C., in a culture where science, philosophy and religion were not separated. The sages of the Milesian school in Ionia were not concerned with such distinctions. Their aim was to discover the essential nature, or real constitution, of things which they called 'physis'. The term 'physics' is derived from this Greek word and meant therefore, originally, the endeavour of seeing the essential nature of all things.

This, of course, is also the central aim of all mystics, and the philosophy of the Milesian school did indeed have a strong mystical flavour. The Milesians were called 'hylozoists', or 'those who think matter is alive', by the later Greeks, because they saw no distinction between animate and inanimate, spirit and matter. In fact, they did not even have a word for matter, since they saw all forms of existence as manifestations of the 'physis', endowed with life and spirituality. Thus Thales declared all things to be full of gods and Anaximander saw the universe as a kind of organism which was supported by 'pneuma', the cosmic breath, in the same way as the human body is supported by air.

The monistic and organic view of the Milesians was very close to that of ancient Indian and Chinese philosophy, and the parallels to Eastern thought are even stronger in the philosophy of Heraclitus of Ephesus. Heraclitus believed in a world of perpetual change, of eternal 'Becoming'. For him, all static Being was based on deception and his universal principle was fire, a symbol for the continuous flow and change of all things. Heraclitus taught that all changes in the world arise from the dynamic and cyclic interplay of opposites and he saw any pair of opposites as a unity. This unity, which contains and transcends all opposing forces, he called the Logos.

The split of this unity began with the Eleatic school, which assumed a Divine Principle standing above all gods and men. This principle was first identified with the unity of the universe, but was later seen as an intelligent and personal God who stands above the world and directs it. Thus began a trend of thought which led, ultimately, to the separation of spirit and matter and to a dualism which became characteristic of Western philosophy.

A drastic step in this direction was taken by Parmenides of Elea who was in strong opposition to Heraclitus. He called his basic principle the Being and held that it was unique and invariable. He considered change to be impossible and regarded the changes we seem to perceive in the world as mere illusions of the senses. The concept of an indestructible substance as the subject of varying properties grew out of this philosophy and became one of the fundamental concepts of Western thought.

In the fifth century B.C., the Greek philosophers tried to overcome the sharp contrast between the views of Parmenides and Heraclitus. In order to reconcile the idea of unchangeable Being (of Parmenides) with that of eternal Becoming (of Heraclitus), they assumed that the Being is manifest in certain invariable substances, the mixture and separation of which gives rise to the changes in the world. This led to the concept of the atom, the smallest indivisible unit of matter, which found its clearest expression in the philosophy of Leucippus and Democritus. The Greek atomists drew a clear line between spirit and matter, picturing matter as being made of several 'basic building blocks'. These were purely passive and intrinsically dead particles moving in the void. The cause of their motion was not explained, but was often associated with external forces which were assumed to be of spiritual origin and fundamentally different from matter. In subsequent centuries, this image became an essential element of Western thought, of the dualism between mind and matter, between body and soul.

As the idea of a division between spirit and matter took hold, the philosophers turned their attention to the spiritual world, rather than the material, to the human soul and the problems of ethics. These questions were to occupy Western thought for more than two thousand years after the culmination of Greek science and culture in the fifth and fourth centuries B.C. The scientific knowledge of antiquity was systematized and organized by Aristotle, who created the scheme which was to be the basis of the Western view of the universe for two thousand years. But Aristotle himself believed that questions concerning the human soul and the contemplation of God's perfection were much more valuable than investigations of

the material world. The reason the Aristotelian model of the universe remained unchallenged for so long was precisely this lack of interest in the material world, and the strong hold of the Christian Church which supported Aristotle's doctrines throughout the Middle Ages.

Further development of Western science had to wait until the Renaissance, when men began to free themselves from the influence of Aristotle and the Church and showed a new interest in nature. In the late fifteenth century, the study of nature was approached, for the first time, in a truly scientific spirit and experiments were undertaken to test speculative ideas. As this development was paralleled by a growing interest in mathematics, it finally led to the formulation of proper scientific theories, based on experiment and expressed in mathematical language. Galileo was the first to combine empirical knowledge with mathematics and is therefore seen as the father of modern science.

The birth of modern science was preceded and accompanied by a development of philosophical thought which led to an extreme formulation of the spirit/matter dualism. This formulation appeared in the seventeenth century in the philosophy of René Descartes who based his view of nature on a fundamental division into two separate and independent realms; that of mind (*res cogitans*), and that of matter (*res extensa*). The 'Cartesian' division allowed scientists to treat matter as dead and completely separate from themselves, and to see the material world as a multitude of different objects assembled into a huge machine. Such a mechanistic world view was held by Isaac Newton who constructed his mechanics on its basis and made it the foundation of classical physics. From the second half of the seventeenth to the end of the nineteenth century, the mechanistic Newtonian model of the universe dominated all scientific thought. It was paralleled by the image of a monarchical God who ruled the world from above by imposing his divine law on it. The fundamental laws of nature searched for by the scientists were thus seen as the laws of God, invariable and eternal, to which the world was subjected.

The philosophy of Descartes was not only important for the development of classical physics, but also had a tremendous

influence on the general Western way of thinking up to the present day. Descartes' famous sentence '*Cogito ergo sum*'—'I think, therefore I exist'—has led Western man to equate his identity with his mind, instead of with his whole organism. As a consequence of the Cartesian division, most individuals are aware of themselves as isolated egos existing 'inside' their bodies. The mind has been separated from the body and given the futile task of controlling it, thus causing an apparent conflict between the conscious will and the involuntary instincts. Each individual has been split up further into a large number of separate compartments, according to his or her activities, talents, feelings, beliefs, etc., which are engaged in endless conflicts generating continuous metaphysical confusion and frustration.

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Modern Physics

This inner fragmentation of man mirrors his view of the world 'outside' which is seen as a multitude of separate objects and events. The natural environment is treated as if it consisted of separate parts to be exploited by different interest groups. The fragmented view is further extended to society which is split into different nations, races, religious and political groups. The belief that all these fragments—in ourselves, in our environment and in our society—are really separate can be seen as the essential reason for the present series of social, ecological and cultural crises. It has alienated us from nature and from our fellow human beings. It has brought a grossly unjust distribution of natural resources creating economic and political disorder; an ever rising wave of violence, both spontaneous and institutionalized, and an ugly, polluted environment in which life has often become physically and mentally unhealthy.

The Cartesian division and the mechanistic world view have thus been beneficial and detrimental at the same time. They were extremely successful in the development of classical physics and technology, but had many adverse consequences for our civilization. It is fascinating to see that twentieth-century science, which originated in the Cartesian split and in the mechanistic world view, and which indeed only became possible because of such a view, now overcomes this fragmentation and leads back to the idea of unity expressed in the early Greek and Eastern philosophies.

In contrast to the mechanistic Western view, the Eastern

view of the world is 'organic'. For the Eastern mystic, all things and events perceived by the senses are interrelated, connected, and are but different aspects or manifestations of the same ultimate reality. Our tendency to divide the perceived world into individual and separate things and to experience ourselves as isolated egos in this world is seen as an illusion which comes from our measuring and categorizing mentality. It is called avidya, or ignorance, in Buddhist philosophy and is seen as the state of a disturbed mind which has to be overcome:

When the mind is disturbed, the multiplicity of things is produced, but when the mind is quieted, the multiplicity of things disappears.<sup>4</sup>

Although the various schools of Eastern mysticism differ in many details, they all emphasize the basic unity of the universe which is the central feature of their teachings. The highest aim for their followers—whether they are Hindus, Buddhists or Taoists—is to become aware of the unity and mutual interrelation of all things, to transcend the notion of an isolated individual self and to identify themselves with the ultimate reality. The emergence of this awareness—known as 'enlightenment'—is not only an intellectual act but is an experience which involves the whole person and is religious in its ultimate nature. For this reason, most Eastern philosophies are essentially religious philosophies.

In the Eastern view, then, the division of nature into separate objects is not fundamental and any such objects have a fluid and ever-changing character. The Eastern world view is therefore intrinsically dynamic and contains time and change as essential features. The cosmos is seen as one inseparable reality—for ever in motion, alive, organic; spiritual and material at the same time.

Since motion and change are essential properties of things, the forces causing the motion are not outside the objects, as in the classical Greek view, but are an intrinsic property of matter. Correspondingly, the Eastern image of the Divine is not that of a ruler who directs the world from above, but of a principle that controls everything from within:

He who, dwelling in all things,  
Yet is other than all things,  
Whom all things do not know,

Whose body all things are,  
Who controls all things from within—  
He is your Soul, the Inner Controller,  
The Immortal.<sup>5</sup>

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Modern  
Physics

The following chapters will show that the basic elements of the Eastern world view are also those of the world view emerging from modern physics. They are intended to suggest that Eastern thought and, more generally, mystical thought provide a consistent and relevant philosophical background to the theories of contemporary science; a conception of the world in which man's scientific discoveries can be in perfect harmony with his spiritual aims and religious beliefs. The two basic themes of this conception are the unity and interrelation of all phenomena and the intrinsically dynamic nature of the universe. The further we penetrate into the submicroscopic world, the more we shall realize how the modern physicist, like the Eastern mystic, has come to see the world as a system of inseparable, interacting and ever-moving components with man being an integral part of this system.

The organic, 'ecological' world view of the Eastern philosophies is no doubt one of the main reasons for the immense popularity they have recently gained in the West, especially among young people. In our Western culture, which is still dominated by the mechanistic, fragmented view of the world, an increasing number of people have seen this as the underlying reason for the widespread dissatisfaction in our society, and many have turned to Eastern ways of liberation. It is interesting, and perhaps not too surprising, that those who are attracted by Eastern mysticism, who consult the *I Ching* and practise Yoga or other forms of meditation, in general have a marked anti-scientific attitude. They tend to see science, and physics in particular, as an unimaginative, narrow-minded discipline which is responsible for all the evils of modern technology.

This book aims at improving the image of science by showing that there is an essential harmony between the spirit of Eastern wisdom and Western science. It attempts to suggest that modern physics goes far beyond technology, that the way—or *Tao*—of physics can be a path with a heart, a way to spiritual knowledge and self-realization.

## 2 KNOWING AND SEEING

From the unreal lead me to the real!

From darkness lead me to light!

From death lead me to immortality!

*Brihad-aranyaka Upanishad*

Before studying the parallels between modern physics and Eastern mysticism, we have to deal with the question of how we can make any comparison at all between an exact science, expressed in the highly sophisticated language of modern mathematics, and spiritual disciplines which are mainly based on meditation and insist on the fact that their insights cannot be communicated verbally.

What we want to compare are the statements made by scientists and Eastern mystics about their knowledge of the world. To establish the proper framework for this comparison, we must firstly ask ourselves what kind of 'knowledge' we are talking about; does the Buddhist monk from Angkor Wat or Kyoto mean the same thing by 'knowledge' as the physicist from Oxford or Berkeley? Secondly, what kind of statements are we going to compare? What are we going to select from the experimental data, equations and theories on the one side, and from the religious scriptures, ancient myths, or philosophical treatises on the other? This chapter is intended to clarify these two points: the nature of the knowledge involved and the language in which this knowledge is expressed.

Throughout history, it has been recognized that the human mind is capable of two kinds of knowledge, or two modes of consciousness, which have often been termed the rational and

the intuitive, and have traditionally been associated with science and religion, respectively. In the West, the intuitive, religious type of knowledge is often devalued in favour of rational, scientific knowledge, whereas the traditional Eastern attitude is in general just the opposite. The following statements about knowledge by two great minds of the West and the East typify the two positions. Socrates in Greece made the famous statement 'I know that I know nothing', and Lao Tzu in China said, 'Not knowing that one knows is best.' In the East, the values attributed to the two kinds of knowledge are often already apparent from the names given to them. The *Upanishads*, for example, speak about a higher and a lower knowledge and associate the lower knowledge with various sciences, the higher with religious awareness. Buddhists talk about 'relative' and 'absolute' knowledge, or about 'conditional truth' and 'transcendental truth'. Chinese philosophy, on the other hand, has always emphasized the complementary nature of the intuitive and the rational and has represented them by the archetypal pair *yin* and *yang* which form the basis of Chinese thought. Accordingly, two complementary philosophical traditions—Taoism and Confucianism—have developed in ancient China to deal with the two kinds of knowledge.

Rational knowledge is derived from the experience we have with objects and events in our everyday environment. It belongs to the realm of the intellect whose function it is to discriminate, divide, compare, measure and categorize. In this way, a world of intellectual distinctions is created; of opposites which can only exist in relation to each other, which is why Buddhists call this type of knowledge 'relative'.

Abstraction is a crucial feature of this knowledge, because in order to compare and to classify the immense variety of shapes, structures and phenomena around us we cannot take all their features into account, but have to select a few significant ones. Thus we construct an intellectual map of reality in which things are reduced to their general outlines. Rational knowledge is thus a system of abstract concepts and symbols, characterized by the linear, sequential structure which is typical of our thinking and speaking. In most languages this linear structure is made explicit by the use of alphabets which serve to communicate experience and thought in long lines of letters.

The natural world, on the other hand, is one of infinite varieties and complexities, a multidimensional world which contains no straight lines or completely regular shapes, where things do not happen in sequences, but all together; a world where—as modern physics tells us—even empty space is curved. It is clear that our abstract system of conceptual thinking can never describe or understand this reality completely. In thinking about the world we are faced with the same kind of problem as the cartographer who tries to cover the curved face of the Earth with a sequence of plane maps. We can only expect an approximate representation of reality from such a procedure, and all rational knowledge is therefore necessarily limited.

The realm of rational knowledge is, of course, the realm of science which measures and quantifies, classifies and analyses. The limitations of any knowledge obtained by these methods have become increasingly apparent in modern science, and in particular in modern physics which has taught us, in the words of Werner Heisenberg, ‘that every word or concept, clear as it may seem to be, has only a limited range of applicability.’<sup>1</sup>

For most of us it is very difficult to be constantly aware of the limitations and of the relativity of conceptual knowledge. Because our representation of reality is so much easier to grasp than reality itself, we tend to confuse the two and to take our concepts and symbols for reality. It is one of the main aims of Eastern mysticism to rid us of this confusion. Zen Buddhists say that a finger is needed to point at the moon, but that we should not trouble ourselves with the finger once the moon is recognized; the Taoist sage Chuang Tzu wrote:

Fishing baskets are employed to catch fish; but when the fish are got, the men forget the baskets; snares are employed to catch hares; but when the hares are got, men forget the snares. Words are employed to convey ideas; but when the ideas are grasped, men forget the words.<sup>2</sup>

In the West, the semanticist Alfred Korzybski made exactly the same point with his powerful slogan, ‘The map is not the territory’.

What the Eastern mystics are concerned with is a direct experience of reality which transcends not only intellectual

thinking but also sensory perception. In the words of the *Upanishads*,

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Knowing  
and  
Seeing

What is soundless, touchless, formless, imperishable,  
Likewise tasteless, constant, odourless,  
Without beginning, without end, higher than the great,  
stable—  
By discerning That, one is liberated from the mouth of  
death.<sup>3</sup>

Knowledge which comes from such an experience is called 'absolute knowledge' by Buddhists because it does not rely on the discriminations, abstractions and classifications of the intellect which, as we have seen, are always relative and approximate. It is, so we are told by Buddhists, the direct experience of undifferentiated, undivided, indeterminate 'suchness'. Complete apprehension of this suchness is not only the core of Eastern mysticism, but is the central characteristic of all mystical experience.

The Eastern mystics repeatedly insist on the fact that the ultimate reality can never be an object of reasoning or of demonstrable knowledge. It can never be adequately described by words, because it lies beyond the realms of the senses and of the intellect from which our words and concepts are derived. The *Upanishads* say about it:

There the eye goes not,  
Speech goes not, nor the mind.  
We know not, we understand not  
How one would teach it.<sup>4</sup>

Lao Tzu, who calls this reality the *Tao*, states the same fact in the opening line of the *Tao Te Ching*: 'The *Tao* that can be expressed is not the eternal *Tao*.' The fact—obvious from any reading of the newspapers—that mankind has not become much wiser over the past two thousand years, in spite of a prodigious increase in rational knowledge, is ample evidence of the impossibility of communicating absolute knowledge by words. As Chuang Tzu said, 'If it could be talked about, everybody would have told their brother.'<sup>5</sup>

Absolute knowledge is thus an entirely non-intellectual

experience of reality, an experience arising in a non-ordinary state of consciousness which may be called a 'meditative' or mystical state. That such a state exists has not only been testified by numerous mystics in the East and West but is also indicated by psychological research. In the words of William James:

Our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different.<sup>6</sup>

Although physicists are mainly concerned with rational knowledge and mystics with intuitive knowledge, both types of knowledge occur in both fields. This becomes apparent when we examine how knowledge is obtained and how it is expressed, both in physics and Eastern mysticism.

In physics, knowledge is acquired through the process of scientific research which can be seen to proceed in three stages. The first stage consists in gathering experimental evidence about the phenomena to be explained. In the second stage, the experimental facts are correlated with mathematical symbols and a mathematical scheme is worked out which interconnects these symbols in a precise and consistent way. Such a scheme is usually called a mathematical model or, if it is more comprehensive, a theory. This theory is then used to predict the results of further experiments which are undertaken to check all its implications. At this stage, physicists may be satisfied when they have found a mathematical scheme and know how to use it to predict experiments. But eventually, they will want to talk about their results to non-physicists and will therefore have to express them in plain language. This means they will have to formulate a model in ordinary language which interprets their mathematical scheme. Even for the physicists themselves, the formulation of such a verbal model, which constitutes the third stage of research, will be a criterion of the understanding they have reached.

In practice, of course, the three stages are not neatly separated and do not always occur in the same order. For example, a physicist may be led to a particular model by some philosophical

belief he (or she) holds, which he may continue to believe in, even when contrary experimental evidence arises. He will then—and this happens in fact very often—try to modify his model so that it can account for the new experiments. But if experimental evidence continues to contradict the model he will eventually be forced to drop it.

This way of basing all theories firmly on experiment is known as the scientific method and we shall see that it has its counterpart in Eastern philosophy. Greek philosophy, on the other hand, was fundamentally different in that respect. Although Greek philosophers had extremely ingenious ideas about nature which often come very close to modern scientific models, the enormous difference between the two is the empirical attitude of modern science which was by and large foreign to the Greek mind. The Greeks obtained their models deductively from some fundamental axiom or principle and not inductively from what had been observed. On the other hand, of course, the Greek art of deductive reasoning and logic is an essential ingredient in the second stage of scientific research, the formulation of a consistent mathematical model, and thus an essential part of science.

Rational knowledge and rational activities certainly constitute the major part of scientific research, but are not all there is to it. The rational part of research would, in fact, be useless if it were not complemented by the intuition that gives scientists new insights and makes them creative. These insights tend to come suddenly and, characteristically, not when sitting at a desk working out the equations, but when relaxing, in the bath, during a walk in the woods, on the beach, etc. During these periods of relaxation after concentrated intellectual activity, the intuitive mind seems to take over and can produce the sudden clarifying insights which give so much joy and delight to scientific research.

Intuitive insights, however, are of no use to physics unless they can be formulated in a consistent mathematical framework, supplemented by an interpretation in plain language. Abstraction is a crucial feature of this framework. It consists, as mentioned before, of a system of concepts and symbols which constitute a map of reality. This map represents only some features of reality; we do not know exactly which these

are, since we started compiling our map gradually and without critical analysis in our childhood. The words of our language are thus not clearly defined. They have several meanings, many of which pass only vaguely through our mind and remain largely in our subconscious when we hear a word.

The inaccuracy and ambiguity of our language is essential for poets who work largely with its subconscious layers and associations. Science, on the other hand, aims for clear definitions and unambiguous connections, and therefore it abstracts language further by limiting the meaning of its words and by standardizing its structure, in accordance with the rules of logic. The ultimate abstraction takes place in mathematics where words are replaced by symbols and where the operations of connecting the symbols are rigorously defined. In this way, scientists can condense information into one equation, i.e. into one single line of symbols, for which they would need several pages of ordinary writing.

The view that mathematics is nothing but an extremely abstracted and compressed language does not go unchallenged. Many mathematicians, in fact, believe that mathematics is not just a language to describe nature, but is inherent in nature itself. The originator of this belief was Pythagoras who made the famous statement 'All things are numbers' and developed a very special kind of mathematical mysticism. Pythagorean philosophy thus introduced logical reasoning into the domain of religion, a development which, according to Bertrand Russell, was decisive for Western religious philosophy:

The combination of mathematics and theology, which began with Pythagoras, characterized religious philosophy in Greece, in the Middle Ages, and in modern times down to Kant ... In Plato, St Augustine, Thomas Aquinas, Descartes, Spinoza and Leibniz there is an intimate blending of religion and reasoning, of moral aspiration with logical admiration of what is timeless, which comes from Pythagoras, and distinguishes the intellectualized theology of Europe from the more straightforward mysticism of Asia.<sup>7</sup>

The 'more straightforward mysticism of Asia' would, of course, not adopt the Pythagorean view of mathematics. In the Eastern view, mathematics, with its highly differentiated and well defined structure, must be seen as part of our conceptual map and not as a feature of reality itself. Reality, as experienced by the mystic, is completely indeterminate and undifferentiated.

The scientific method of abstraction is very efficient and powerful, but we have to pay a price for it. As we define our system of concepts more precisely, as we streamline it and make the connections more and more rigorous, it becomes increasingly detached from the real world. Using again Korzybski's analogy of the map and the territory, we could say that ordinary language is a map which, due to its intrinsic inaccuracy, has a certain flexibility so that it can follow the curved shape of the territory to some degree. As we make it more rigorous, this flexibility gradually disappears, and with the language of mathematics we have reached a point where the links with reality are so tenuous that the relation of the symbols to our sensory experience is no longer evident. This is why we have to supplement our mathematical models and theories with verbal interpretations, again using concepts which can be understood intuitively, but which are slightly ambiguous and inaccurate.

It is important to realize the difference between the mathematical models and their verbal counterparts. The former are rigorous and consistent as far as their internal structure is concerned, but their symbols are not directly related to our experience. The verbal models, on the other hand, use concepts which can be understood intuitively, but are always inaccurate and ambiguous. They are in this respect not different from philosophical models of reality and thus the two can very well be compared.

If there is an intuitive element in science, there is also a rational element in Eastern mysticism. The degree to which reason and logic are emphasized, however, varies enormously from one school to the other. The Hindu Vedanta, or the Buddhist Madhyamika, for example, are highly intellectual schools,

whereas Taoists have always had a deep mistrust of reason and logic. Zen, which grew out of Buddhism but was strongly influenced by Taoism, prides itself on being 'without words, without explanations, without instructions, without knowledge'. It concentrates almost entirely on the experience of enlightenment and is only marginally interested in interpreting this experience. A well known Zen phrase says 'The instant you speak about a thing you miss the mark.'

Although other schools of Eastern mysticism are less extreme, the direct mystical experience is at the core of all of them. Even those mystics who are engaged in the most sophisticated argumentation never see the intellect as their source of knowledge but use it merely to analyse and interpret their personal mystical experience. All knowledge is firmly based on this experience, thus giving the Eastern traditions a strong empirical character that is always emphasized by its proponents. D. T. Suzuki, for example, writes of Buddhism:

Personal experience is ... the foundation of Buddhist philosophy. In this sense Buddhism is radical empiricism or experientialism, whatever dialectic later developed to probe the meaning of enlightenment-experience.<sup>8</sup>

Joseph Needham repeatedly brings the empirical attitude of Taoists into prominence in his work *Science and Civilisation in China* and finds that this attitude has made Taoism the basis of Chinese science and technology. The early Taoist philosophers, in Needham's words, 'withdrew into the wilderness, the forests and mountains, there to meditate upon the Order of Nature, and to observe its innumerable manifestations'.<sup>9</sup> The same spirit is reflected in the Zen verses,

He who would understand the meaning of Buddha-nature  
Must watch for the season and the causal relations.<sup>10</sup>

The firm basis of knowledge on experience in Eastern mysticism suggests a parallel to the firm basis of scientific knowledge on experiment. This parallel is further enforced by the nature of the mystical experience. It is described in the Eastern traditions as a direct insight which lies outside the realm of the intellect and is obtained by watching rather than thinking; by looking inside oneself; by observation.

In Taoism, this notion of observation is embodied in the name for Taoist temples, *kuan*, which originally meant 'to look'. Taoists thus regarded their temples as places of observation. In Ch'an Buddhism, the Chinese version of Zen, enlightenment is often referred to as 'the vision of the Tao', and seeing is regarded as the basis of knowing in all Buddhist schools. The first item of the Eightfold Path, the Buddha's prescription for self-realization, is right seeing, followed by right knowing. D. T. Suzuki writes on this point:

The seeing plays the most important role in Buddhist epistemology, for seeing is at the basis of knowing. Knowing is impossible without seeing; all knowledge has its origin in seeing. Knowing and seeing are thus found generally united in Buddha's teaching. Buddhist philosophy therefore ultimately points to seeing reality as it is. Seeing is experiencing enlightenment.<sup>11</sup>

This passage is also reminiscent of the Yaqui mystic Don Juan who says, 'My predilection is to see ... because only by seeing can a man of knowledge know.'<sup>12</sup>

A word of caution should perhaps be added here. The emphasis on seeing in mystical traditions should not be taken too literally, but has to be understood in a metaphorical sense, since the mystical experience of reality is an essentially non-sensory experience. When the Eastern mystics talk about 'seeing', they refer to a mode of perception which may include visual perception, but which always and essentially transcends it to become a nonsensory experience of reality. What they do emphasize, however, when they talk about seeing, looking or observing, is the empirical character of their knowledge. This empirical approach of Eastern philosophy is strongly reminiscent of the emphasis on observation in science and thus suggests a framework for our comparison. The experimental stage in scientific research seems to correspond to the direct insight of the Eastern mystic, and the scientific models and theories correspond to the various ways in which this insight is interpreted.

The parallel between scientific experiments and mystical experiences may seem surprising in view of the very different nature of these acts of observation. Physicists perform experi-

ments involving an elaborate teamwork and a highly sophisticated technology, whereas mystics obtain their knowledge purely through introspection, without any machinery, in the privacy of meditation. Scientific experiments, furthermore, seem to be repeatable any time and by anybody, whereas mystical experiences seem to be reserved for a few individuals at special occasions. A closer examination shows, however, that the differences between the two kinds of observation lie only in their approach and not in their reliability or complexity.

Anybody who wants to repeat an experiment in modern subatomic physics has to undergo many years of training. Only then will he or she be able to ask nature a specific question through the experiment and to understand the answer. Similarly, a deep mystical experience requires, generally, many years of training under an experienced master and, as in the scientific training, the dedicated time does not alone guarantee success. If the student is successful, however, he or she will be able to 'repeat the experiment'. The repeatability of the experience is, in fact, essential to every mystical training and is the very aim of the mystics' spiritual instruction.

A mystical experience, therefore, is not any more unique than a modern experiment in physics. On the other hand, it is not less sophisticated either, although its sophistication is of a very different kind. The complexity and efficiency of the physicist's technical apparatus is matched, if not surpassed, by that of the mystic's consciousness—both physical and spiritual—in deep meditation. The scientists and the mystics, then, have developed highly sophisticated methods of observing nature which are inaccessible to the layperson. A page from a journal of modern experimental physics will be as mysterious to the uninitiated as a Tibetan mandala. Both are records of enquiries into the nature of the universe.

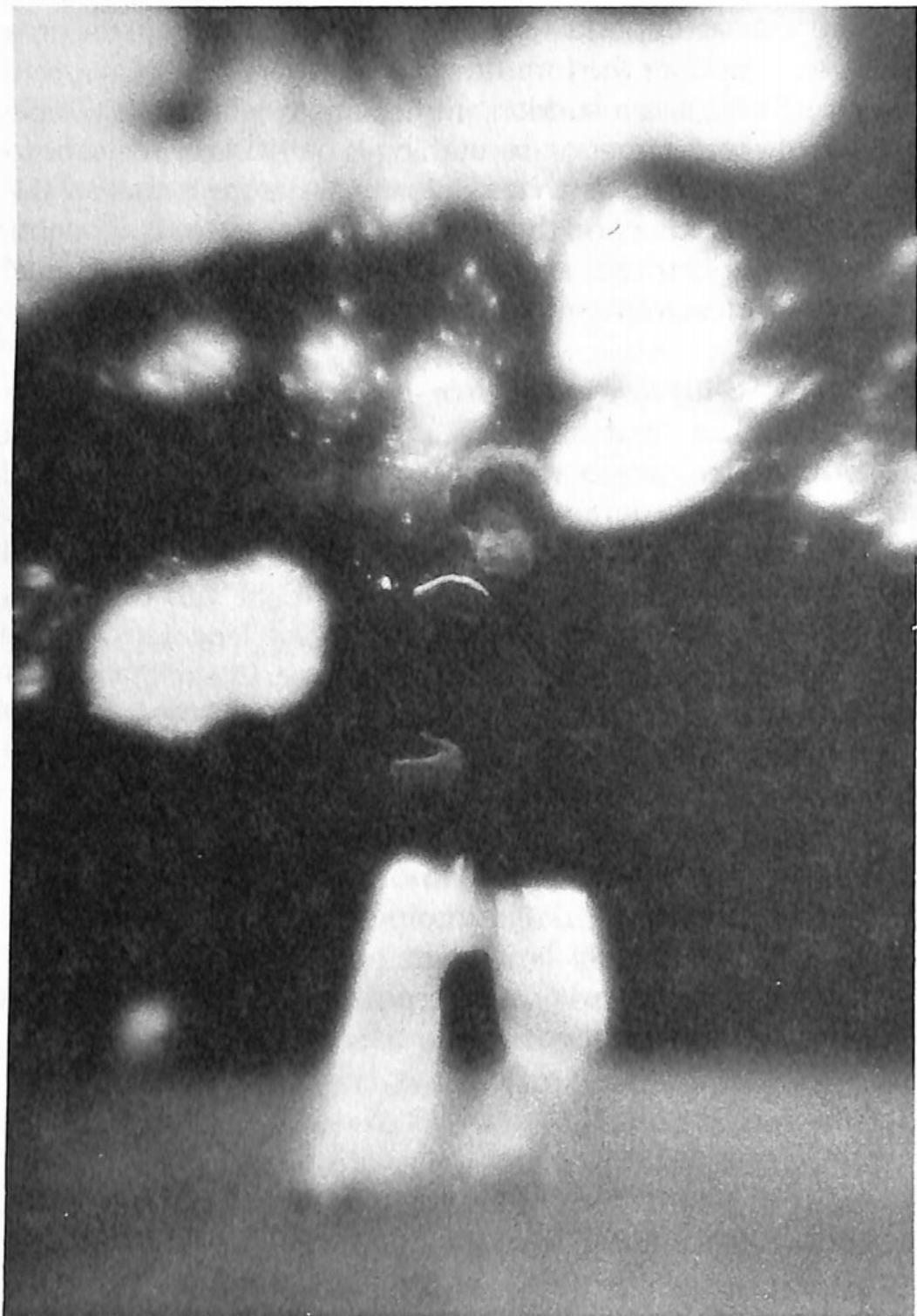
Although deep mystical experiences do not, in general, occur without long preparation, direct intuitive insights are experienced by all of us in our everyday lives. We are all familiar with the situation where we have forgotten the name of a person or place, or some other word, and cannot produce it in spite of the utmost concentration. We have it 'on the tip

of our tongue' but it just will not come out, until we give up and shift our attention to-something else when suddenly, in a flash, we remember the forgotten name. No thinking is involved in this process. It is a sudden, immediate insight. This example of suddenly remembering something is particularly relevant to Buddhism which holds that our original nature is that of the enlightened Buddha and that we have just forgotten it. Students of Zen Buddhism are asked to discover their 'original face' and the sudden 'remembering' of this face is their enlightenment.

Another well known example of spontaneous intuitive insights are jokes. In the split second where you understand a joke you experience a moment of 'enlightenment'. It is well known that this moment must come spontaneously, that it cannot be achieved by 'explaining' the joke, i.e. by intellectual analysis. Only with a sudden intuitive insight into the nature of the joke do we experience the liberating laughter the joke is meant to produce. The similarity between a spiritual insight and the understanding of a joke must be well known to enlightened men and women, since they almost invariably show a great sense of humour. Zen, especially, is full of funny stories and anecdotes, and in the *Tao Te Ching* we read, 'If it were not laughed at, it would not be sufficient to be Tao.'<sup>13</sup>

In our everyday life, direct intuitive insights into the nature of things are normally limited to extremely brief moments. Not so in Eastern mysticism where they are extended to long periods and, ultimately, become a constant awareness. The preparation of the mind for this awareness—for the immediate, nonconceptual awareness of reality—is the main purpose of all schools of Eastern mysticism, and of many aspects of the Eastern way of life. During the long cultural history of India, China and Japan, an enormous variety of techniques, rituals and art forms have been developed to achieve this purpose, all of which may be called meditation in the widest sense of the word.

The basic aim of these techniques seems to be to silence the thinking mind and to shift the awareness from the rational to the intuitive mode of consciousness. In many forms of meditation, this silencing of the rational mind is achieved by concentrating one's attention on a single item, like one's



breathing, the sound of a mantra, or the visual image of a mandala. Other schools focus the attention on body movements which have to be performed spontaneously without the interference of any thought. This is the way of the Hindu Yoga and of the Taoist *T'ai Chi Ch'uan*. The rhythmical movements

of these schools can lead to the same feeling of peace and serenity which is characteristic of the more static forms of meditation; a feeling which, incidentally, may be evoked also by some sports. In my experience, for example, skiing has been a highly rewarding form of meditation.

Eastern art forms, too, are forms of meditation. They are not so much means for expressing the artist's ideas as ways of self-realization through the development of the intuitive mode of consciousness. Indian music is not learned by reading notes, but by listening to the play of the teacher and thus developing a feeling for the music, just as the *T'ai Chi* movements are not learned by verbal instructions but by doing them over and over again in unison with the teacher. Japanese tea ceremonies are full of slow, ritualistic movements. Chinese calligraphy requires the uninhibited, spontaneous movement of the hand. All these skills are used in the East to develop the meditative mode of consciousness.

For most people, and especially for intellectuals, this mode of consciousness is a completely new experience. Scientists are familiar with direct intuitive insights from their research, because every new discovery originates in such a sudden non-verbal flash. But these are extremely short moments which arise when the mind is filled with information, with concepts and thought patterns. In meditation, on the other hand, the mind is emptied of all thoughts and concepts and thus prepared to function for long periods through its intuitive mode. Lao Tzu speaks about this contrast between research and meditation when he says:

He who pursues learning will increase every day;  
He who pursues Tao will decrease every day.<sup>14</sup>

When the rational mind is silenced, the intuitive mode produces an extraordinary awareness; the environment is experienced in a direct way without the filter of conceptual thinking. In the words of Chuang Tzu, 'The still mind of the sage is a mirror of heaven and earth—the glass of all things.'<sup>15</sup> The experience of oneness with the surrounding environment is the main characteristic of this meditative state. It is a state of consciousness where every form of fragmentation has

ceased, fading away into undifferentiated unity.

In deep meditation, the mind is completely alert. In addition to the nonsensory apprehension of reality it also takes in all the sounds, sights, and other impressions of the surrounding environment, but it does not hold the sensory images to be analysed or interpreted. They are not allowed to distract the attention. Such a state of awareness is not unlike the state of mind of a warrior who expects an attack in extreme alertness, registering everything that goes on around him without being distracted by it for an instant. The Zen master Yasutani Roshi uses this image in his description of *shikan-taza*, the practice of Zen meditation:

*Shikan-taza* is a heightened state of concentrated awareness wherein one is neither tense nor hurried, and certainly never slack. It is the mind of somebody facing death. Let us imagine that you are engaged in a duel of swordsmanship of the kind that used to take place in ancient Japan. As you face your opponent you are unceasingly watchful, set, ready. Were you to relax your vigilance even momentarily, you would be cut down instantly. A crowd gathers to see the fight. Since you are not blind you see them from the corner of your eye, and since you are not deaf you hear them. But not for an instant is your mind captured by these sense impressions.<sup>16</sup>

Because of the similarity between the meditative state and the frame of mind of a warrior, the image of the warrior plays an important role in the spiritual and cultural life of the East. The stage for India's favourite religious text, the *Bhagavad Gita*, is a battlefield and martial arts constitute an important part in the traditional cultures of China and Japan. In Japan, the strong influence of Zen on the tradition of the samurai gave rise to what is known as *bushido*, 'the way of the warrior', an art of swordsmanship where the spiritual insight of the swordsman reaches its highest perfection. The Taoist *T'ai Chi Ch'uan*, which was considered to be the supreme martial art in China, combines slow and rhythmical 'yogic' movements with the total alertness of the warrior's mind in a unique way.

Eastern mysticism is based on direct insights into the nature