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TOWARD SUSTAINABLE SCIENCE

A Buddhist look at trends in scientific development

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Translator's Foreword

When transmitting any set of ideas from one culture to another, we are confronted not only with a difference of language, but a disparity of backgrounds and cultural values. This is particularly so when the ideas stem from an examination of one culture through the eyes of another. This book is one such examination: a collection of reflections and suggestions on a traditionally Western domain -- science -- from a traditionally Eastern point of view -- that of a Buddhist monk.

Many of the ideas and concepts presented here may seem strange to the Western reader uninitiated into traditional Buddhist thinking, which necessitates some initial guidance. I advise the reader to open up to a new set of values -- not necessarily agreeing with or denying them, but trying to see the meaning within them.

The contents of the book are taken from the National Science Day Lecture given by Bhikkhu P.A. Payutto at the Faculty of Science, Chiang Mai University, in August 1991, which was recorded and later printed in the Thai language as Buddhasasana ny Thana Pen Rahk Than Korng Wityasaht (published by the Science Faculty, Chiang Mai University, 1992). For this third revised edition I would like to express my thanks to Venerable Jayasaro Bhikkhu, who gave many helpful editorial suggestions. They have helped to produce a more polished product than the first edition, which was somewhat rushed.

It may be helpful to appreciate the vast disparity between the cultural context in which the talk was given and that in which the book will be received. The talks were given at one of Thailand's major universities to an audience of highly educated, modernized Thais. Like many people in modern times, many members of the audience had drifted away from their native religion, Buddhism, because of the unscientific stigma attached to religion from the West. Venerable Payutto takes the position of a concerned father chiding his children, pointing out to them the great value of that which they have left behind. In the process he gives us as Westerners some invaluable insights into our own ways of thinking and confronts our whole cultural development with questions that, particularly at this time, demand answers.

Essentially, then, the talk was given to Thai Buddhists. Now, in book form, it is being presented to Westerners. I hope the reader will be open and at the same time discerning, taking heed of those teachings which are relevant to our situation (not just agreeing with those that we like or disagreeing with those that we don't) and making a sincere effort to benefit from them. In the final analysis, the teachings lead only to benefit, not to harm. The question is, are we ready to benefit from them?

Bruce Evans

Introduction

In this modern, scientific age the sciences and technology have enjoyed remarkable progress, leading to the rapid and exciting changes we see around us. One of the most important factors in this progress is the expertise resulting from specialization, which has enabled human beings to utilize profound and highly detailed stores of knowledge. This knowledge has in turn been used to answer mankind's needs on a practical level, which is a concrete and tangible fruit of scientific research. Science is at the vanguard of this specialized approach to research, and the exciting developments of technology are a concrete manifestation of it.

Before embarking on this quest for specialization, human beings lived surrounded by innumerable natural forces, all of which had a great effect on their lives. Human beings were ignorant of the causes for these natural phenomena, how they affected their lives, or how they were related to each other -- all of nature was a mysterious enigma.

In order to know and understand the natural world, human beings were motivated to begin searching for answers, with a variety of different people searching in a variety of ways, amassing knowledge in ever-increasing detail. But the more they learned, the more there was to learn, and the search for knowledge went deeper and deeper into specialized channels. The world has long been absorbed in this specialized search for knowledge and delighting in the knowledge found. Now we find ourselves immersed in a mass of minutiae, and we tend to think, speak, act and try to solve problems in a specialized way.

We seem to have forgotten that the original objective of this meticulous and compartmentalized search for knowledge was an understanding of the relationship which natural phenomena have on human life, both from a specialized perspective and from a holistic one. With researchers drowning in the data of their own isolated fields of research, human knowledge becomes fragmented and disjointed. We have till now concerned ourselves mainly with the wonders that all this knowledge has enabled us to produce, to the neglect of the fundamental problems with which humanity is still faced.

Ultimately, an impasse has been reached, and we are beginning to see warning signals. This impasse can be seen on two levels:

1. In the search for knowledge: some of the branches of learning, especially physics, which is leading the race for knowledge, seem to have reached the limits that depth and detail can take them. They are incapable of understanding the basic truths of nature, because such an understanding demands an awareness of other fields of learning. This has forced researchers to look for ways to transcend their self-imposed specialized limitations and integrate their knowledge with other fields. At the very least, they are beginning to realize that research in any one specialized field will not lead to realization of the truth.

2. In the application of knowledge: the practical application of knowledge has been geared mostly to responding to human needs and desires. This has led to many problems, which the funnel vision arising from specialization prevented us from foreseeing. These problems are becoming increasingly urgent, even threatening the destruction of the human race. The most obvious and urgent of them is the destruction of the environment, which is forcing us to search for a solution based on a more integrated approach to knowledge.

One of the most important indications of the extent to which the specialized approach to knowledge has developed is the human ability to synthesize both knowledge and new products. Such developments have caused many scientists to delude themselves into believing that they have penetrated reality and conquered nature.

But in fact such knowledge of causal factors and relationships is still limited to the confines of specialization. Beyond these confines, in the whole natural order, such knowledge is inadequate, and the practical application of it leads to problems. It has led to an impasse, one that has awakened humanity to its limitations. The realization of this impasse and its implications is itself one of the most recent advances of research.

From this realization and awareness of the insufficiency of human knowledge, movements have begun to try to integrate the knowledge of these various specialized fields and arrive at a more holistic understanding of the natural order, one which includes both mankind and the natural environment, both the physical world and the mental. This step beyond the confines of specialization and the attempts to integrate diverse bodies of knowledge is a change in direction for mankind, one which has been very difficult to make.

In the context of a holistic understanding of the natural order, the human position within it, and the development of a beneficial human society, the extremely detailed knowledge of specialization has in effect led nowhere, and human beings are still very much in the dark. Science, as the major actor in this scenario, the leader of the quest for knowledge and specialization, is in a most opportune position to help the world in this regard, by integrating its research and knowledge with other fields of learning in order to arrive at a more holistic understanding of the natural order.

That the Science Faculty of Chiang Mai University invited me to present a lecture, which is the source material for this book, and organized the printing of editions of the book in both Thai and English, is a beginning in this direction. It is a gesture of open-mindedness and willingness to consider ideas about the field of science in the eyes of a field which is traditionally regarded as its direct opposite -- religion.

It is worth mentioning here that Buddhism has never seen science as an antagonist. Buddhism welcomes scientific knowledge, recognizing it as another branch of learning about the natural order. Many Buddhists are in fact hopeful that the truths unearthed by science will serve to support and verify the timeless teachings given by the Buddha thousands of years ago. At the very least scientific knowledge may reveal the truths of the physical world, which can only help to improve our understanding of life and mankind's place in the natural order, especially when such knowledge is incorporated with knowledge about the mental world or human world as explained through the teachings of Buddhism.

From the perspective of academic research, this book represents a step toward a more integrated approach to academic learning, broadening the fields of research by recognizing that religion is one branch of the humanities. It is not only academic learning which stands to gain, but human civilization, society and the whole human race.

I would like to extend my appreciation to Ajahn Chatchawal Poonpun, of the Science Faculty of Chiang Mai University, who diligently took upon himself the task of helping the Science Faculty realize its objective,

and also saw to the subsequent extension of that first initiative into the printed page. I would also like to extend my appreciation to Khun Yongyuth Dhanapura, the Director of the Buddhadhamma Foundation, who tirelessly dedicates himself to the task of spreading the Buddha's teachings.

I would like to express my thanks to Venerable Phra Kru Palat Insorn (Cintapanno) who has given of his time and energy in the preparation through the Desk Top Publishing process of the original Thai text, which was the source from which the English translation was taken.

Last but not least, I would like to extend my appreciation to Bruce Evans, who brought to the English translation of the Thai book not only a fluency in both the Thai and English languages, but an understanding of the Buddha's teachings and a dedication to the work, resulting in this admirable English version of the talk in book form. For any inaccuracies which may be remaining in the text, I myself take responsibility.

Bhikkhu P.A. Payutto

November 30, 1993

Preamble

National Science Day Lecture, given at Chiang Mai University, Northern Thailand, on August 16, 1991, entitled, "Buddhism as the Foundation of Science."

To many people, the notion of a Buddhist monk talking about science may seem surprising or incongruous, but I feel that such a reaction is unwarranted. It might be necessary to come to some understanding with each other before beginning the subject matter proper of this book in order to establish a better frame of mind.

The perception of me as a religious scholar talking about scientific matters may be a result of modern tendencies. Our age is one of specialists. We tend to put people into pigeonholes -- religious, scientific, economic and so on -- each specializing in his or her own particular field. But I don't think of myself as a religious scholar, and I don't want to be called one. I am simply a Buddhist monk.

To be a Buddhist monk is not necessarily to be a religious scholar, and vice versa. To be a Buddhist monk means to live a certain way of life. To use current terminology, we could say that it is a "specialized" way of life. Religion, on the other hand, is a specialized branch of knowledge. One who has a specialized life style has a role to play, defined by the constraints of that life style, which, in this case, is designed to allow him to live as skilfully as possible on both the personal and social levels. Specialized academic disciplines result from dividing knowledge up into categories. There is no consideration of life style involved, it is a purely academic concern. In this light it is inaccurate to call a Buddhist monk a religious scholar.

Today's lecture, "Buddhism as the Foundation of Science," should not be looked on as a meeting between two disparate academic disciplines. This kind of attitude leads to the impression that you are about to

witness some kind of strange confrontation. Let us remember that science is our subject of discussion, our meeting ground. Scientists are the owners of this branch of knowledge, the ones most conversant with it, and now the scientists are allowing me, an outsider, to give some reflections about science. If it is understood in this way, the spirit of the lecture will be more easily grasped.

Thus it isn't necessary for the speaker, an outsider, to have such a vast knowledge of the subject of science. He may know some things about science, of much he may be ignorant, he may speak rightly or wrongly, but nonetheless there is something to be gained from the lecture, even if only an idea of how scientists are viewed by outsiders. And of what use is that? Practically speaking, it is impossible to live or act completely alone. We must interact with other ways of thinking and with events around us. We must be able to interact with other people and other branches of knowledge. If such interaction is successful, then the quality of our own work is enhanced. If it is not successful, our own activity or field of knowledge suffers accordingly.

So this lecture is about science through the eyes of an outsider, in this case a Buddhist monk. As to how a Buddhist monk views science, this will become clear as the lecture proceeds.

A second point that I would like to clarify is in relation to the title of the lecture. Not only is a religious person talking about science -- he is even claiming that his religion is the foundation of science! I won't go into the reasons for this title at present, but would simply like to state that it is inspired by the words of a scientist, and an eminent one at that. He didn't use the exact words I have used, but I don't think I have misrepresented him. In any case, I don't put too much weight on the matter, and as I will be explaining it in the progress of the talk, I don't think you need trouble yourselves over whether Buddhism really is the foundation of science or not. Any benefit you obtain from today's lecture, or whether Buddhism really is the foundation of science, are things that you can each decide for yourselves at your own discretion.

I would like to clarify the meaning of two of the words that will be used throughout this talk, and they are "Buddhism" and "science." By Buddhism here I do not mean the institutional form of Buddhism, but its essential teaching, which is an abstract quality. As for science, we may have a problem. Some scientists may feel that in this context, only pure science should be considered, not applied science or technology. But whenever the average person thinks of the word "science," he thinks of the whole totality, not this narrow definition. I myself am an average person, an outsider like most people. I speak of science in a very general sort of way, including both the pure and the applied sciences.

Chapter 1

Science and Technology

At the outset we must acknowledge the innumerable blessings bestowed on us by science. Nobody will dispute the enormous value science has for us. In order to be able to give this lecture, I have travelled all the way from Bangkok to Chiang Mai in only one hour. Back in the days of King Rama I, you would have had to wait three months for me to get here, and for that matter I probably wouldn't have come at all. For this we must acknowledge science's contribution to travel.

Looking around at communications, we see radios, telephones, fax machines, televisions, videos and satellites, all of which have arisen from scientific and technological developments. Other obvious areas of development are in the medical world, where so many contagious diseases have now been virtually eradicated. Cholera is now quite rare, bubonic plague no longer exists, and smallpox has all but vanished. We no longer have to fear these infectious diseases. In olden times one could die from an infected appendix, but nowadays an appendectomy is a relatively simple operation. Even brain operations are getting easier. Sophisticated tools for accurate examination and diagnosis are more and more accessible. X-Ray machines are being replaced with computer X-Ray machines, and now we have ultra sound and MRI. It's almost no longer necessary for the doctor to examine the patient, the machines do it for him. These are all examples of extremely valuable technological advances.

But on the other hand, when we really look into it, we find that science, and in particular technology, has created a great many problems for humanity as well. In the present time, particularly in the highly developed countries, there is even a fear that the human race, and indeed the whole world, may meet destruction at the hands of this technological progress. It might be a very instantaneous kind of destruction, at the flick of a switch, so to speak, or it could be a slow and gradual kind of destruction, as the gradual deterioration of the environment.

Even within the immediacy of our everyday lives we are threatened by dangers. We can't be sure whether our food has been contaminated with chemicals or not. Sometimes the plants and animals used for our food supply are treated with hormones to boost their growth. Hogs are given special additives to make their meat turn an appealing red color. Poisonous substances are sometimes used in foods as preservatives, flavor enhancers or dyes, not to mention the uncontrolled use of pesticides. Some of the people who sell these foods wouldn't dare eat them themselves!

Two kinds of technology

The application of science which effects the changes in the natural world is called technology. Technology is dependent for its existence on the knowledge obtained through science. It is the tool, or channel, through which humanity has worked to manipulate nature in the pursuit of material comfort. But at the same time, the dangers which threaten us are also contingent on this technology. Technology is thus both an instrument for finding happiness and a catalyst for danger.

Now in answer to all this, scientists may counter that by "science" we mean only pure science. Pure science seeks to discover and explain the truth, its concern is primarily the search for knowledge. Whatever anybody wants to do with this knowledge is their business, not the concern of science. Pure science tends to shake off responsibility in this regard.

Technology has been accused of using scientific knowledge to its own ends, but this is not entirely true. Initially, technology was aimed at bringing benefit to humanity, but nowadays there are two kinds of technology. One is the technology which is used to create benefit, while the other is used to seek personal gain. What we need is the technology that is used to create benefit, but the problems of the present time exist largely because modern technology is of the kind that seeks personal gain.

If we constrain ourselves to creating benefit, the repercussions arising from technological development will be few and far between, but whenever technology is used to seek personal gain, problems arise. Thus we must clearly distinguish between these two kinds of technology.

The place of ethics

Be it the wrong utilization of scientific knowledge, the utilization of technology for personal gain, or even utilization of technology to destroy the earth, all these problems have arisen entirely as a result of human activity, they are a matter of utilization. Because they are rooted in human activity, their solutions are an ethical or moral concern.

These problems can only be simply and directly solved through moral awareness. Only then will technology and science be used for constructive purposes. With moral awareness, even though there may be some harmful consequences arising from lack of circumspection or ignorance, the prevention and rectification of problems will be on the best possible level.

Mankind has looked to science and technology to bring benefit to human society, but there is no guarantee that science and technology will bring only the benefit that humanity hopes for. These things can be used to create harm or benefit. How they are used is entirely at the disposal of the user.

If we ignore morality or ethics, instead of creating benefit, the most likely result is that science and technology will bring problems, stressing as they do:

1. the unrestrained production and consumption of goods with which to gratify the senses, feeding craving and greed (raga and lobha);

2. escalation of the power to destroy (dosa); and

3. increased availability of objects which lure people into delusion and carelessness (moha).

In so doing, technology tarnishes the quality of life and pollutes the environment. Only true moral awareness can alleviate these destructive influences.

Without morality, technological progress, even the beneficial kind, tends to increase the propensity for destruction. The more science and technology advance, and the more keenly destruction seems to threaten mankind, the more is morality necessitated, and the more will the stability and well-being of humanity be dependent on ethical principles.

In any case, this subject of ethics, although a simple and straightforward one, is largely ignored in modern times. Most people want to live without problems, but they don't want to solve them. As long as ethics are ignored like this, problems will persist.

Science and technology cannot be separated

It is not only science that has fostered technology's growth -- technology has also been a decisive factor in the development of science. It is the scientific method that has enabled scientific

learning to progress to where it is now, and an essential part of the scientific method is observation and experiment. The earliest forms of observation and experiment were carried out through the five senses -- eye, ear, nose, tongue and body, particularly the eyes for looking, the ears for listening and the hands for touching. However, our sense organs have their limitations. With the naked eye we can see a limited number of stars and a limited portion of the universe. With technological development, the telescope was invented, enabling science to make a Great Leap Forward. Microscopic organisms, invisible to the naked eye, were made visible through the invention of the microscope, allowing science to once again make great advances. Pure science, then, has relied heavily on technology for its progress.

The tools used for scientific research are products of technology, that is why science and technology have been inseparably connected in their development. In the present day, scientists are looking to the computer to further their quest for truth. Capable of collecting and collating vast amounts of information, much more than the ordinary human mind, the computer will be indispensable in the testing of hypotheses and the formulation of theories.

The benefits of science appear to the mass of people through technology. Humanity must, however, learn to choose between technology for creating benefit and technology for seeking personal gain.

Reaching the limits and finding no answer

Science has advanced so far-reaching that it seems to be approaching the limits of the physical universe and, as it approaches the limits of that world, it is turning to the mysteries of the mind. What is mind? How does it work? What is consciousness? Does it arise from a physical source, or is it entirely separate from the physical world? These days computers have Artificial Intelligence. Will the development of Artificial Intelligence lead to computers with minds? This is a question some scientists are speculating about.

Modern methods of observation and verification seem to have transcended the limitations of the five senses. We have developed instruments to expand their limited capabilities. Whenever the senses are incapable of perceiving any further, we resort to these technological instruments. Now, even with these instruments, we seem to have reached our limit, and scientific investigations are reduced to mathematical symbols.

As observation, experimentation and analysis enter the sphere of the psyche, science retains its basic attitude and experimental method, and so there is a lot of guesswork and preconception in its operation. It remains to be seen whether science can in fact enter into the domain of the mind, and by what means.

Values and motivation

Even though pure science tends to be distinguished from applied science and technology, pure science nevertheless shares some of the responsibility for the harm resulting from these things. In fact, in the last hundred years or so, pure science has not really been so pure. There are values implicit within pure science which the scientific fraternity is unaware of; and because it isn't aware of these values, scientific research comes unwittingly under their influence.

What is the source of science? All sciences, be they natural or social

sciences, are based on values. Take economics for example. What is the origin or source of economics? It is want. What is want, can it be observed with any of the five senses? It can't, because it is a quality of mind, a value. The discipline known as science claims it is free of values, but in fact it can never be truly value-free because it involves mental qualities.

Where is the source of the physical sciences? The source of science is the desire to know the truth of nature, or reality. This answer is acceptable to most scientists, and in fact it was given by a scientist. The desire to know nature's truths, together with the belief that nature does have constant laws, which function according to cause and effect, are the two foundations on which science bases its quest for nature's secrets.

The source of science is within this human mind, at desire for knowledge and faith. Without these two mental qualities it would be impossible for science to grow and develop. The motivation which drove the early developments of science, and which still exists to some extent, was the desire to know the truths of nature. This was a relatively pure kind of desire. In later times, during the Dark Ages, this desire to know was actively suppressed by the Christian Church and the Inquisition. Those who doubted the word of the Bible, or who made statements which cast doubt on it, were brought before the court and put on trial. If found guilty they were punished. Galileo was one of those brought on trial. He had said that the earth revolved around the sun, and was almost put to death for his beliefs. At the last moment he pleaded guilty and was absolved; he didn't die, but many others were burnt alive at the stake.

At that time there was overt suppression of the search for truth. But the stronger the suppression, the stronger the reaction, so it came about that the suppression and constraint of the Dark Ages had the effect of intensifying the desire to know the truths of nature. This desire has fired the thinking of Western cultures.

This drive can still be considered a relatively pure desire for knowledge. The science we have nowadays, however, is no longer so pure. It has been influenced by two important attitudes or assumptions:

1. That the prosperity of mankind hinges on the subjugation of nature.

This attitude stems from the Christian belief that God created mankind in his own image, to take control of the world and have dominion over nature. God created nature, and all of the things within it, for man's use. Mankind is the leader, the hub of the universe, the master. Mankind learns the secrets of nature in order to manipulate it according to his desires, and nature exists for man's use.

One Western text[1] states that this idea is responsible for Western scientific progress. The text states that in ancient times, people in the East, particularly China and India, were scientifically more advanced than the West, but owing to the influence of this drive to conquer nature, the West has gradually overtaken the East.

So the first major value system is the belief in Man's right to conquer nature. Now we come to the second major influence:

2. That well-being depends on an abundance of material goods.

This line of thinking has exerted a very powerful influence on Western industrial expansion. It has been argued that industries in the West were created to address the problem of scarcity, which is found

throughout Western history. Life in Western countries was beset by hostile elemental forces, such as freezing winters, which made farming impossible. People in such places had to live exceedingly arduous lives. Not only were they subject to freezing temperatures, but also food shortages. Life was a struggle for survival, and this struggle led to the development of industry.

The opposite of scarcity is plenty. People in Western countries saw that happiness hinged on the elimination of scarcity, and this was the impulse behind the Industrial Revolution. The awareness of scarcity and the desire to provide plenty, is in turn based on the assumption that material abundance is the prerequisite for happiness.

This kind of thinking has developed into materialism, and from there, consumerism, a significant contribution to which has been made by industrialists working under the influence of the first line of thinking mentioned above. Coupled with the assumption that happiness is dependent on an abundance of material goods, we have the belief that nature must be conquered in order to cater to man's desires. The two assumptions support each other well.

It seems as if the pure desire for knowledge mentioned earlier has been corrupted, coming under the influence of the desires to conquer nature and to produce an abundance of material goods, or materialism. When these two values enter the picture, the pure desire for knowledge becomes an instrument for satisfying the aims of these secondary values, giving rise to an exploitative relationship with nature.

The assumption is that by conquering nature, mankind will be able to create unlimited material goods with which to cater to his desires, resulting in perfect happiness. The search for methods to implement this assumption naturally follows, leading to the marked material progress we have seen in recent times, especially since the Industrial Revolution. It has been said that the science which has developed in the Industrial Age is a servant of industry. It may be claimed that science has paved the way for industry, but industry says, "Science? That is my servant!"

Together with the development of industry we have observed the gradual appearance, in ever-increasing severity, of the harmful effects contingent on it. Now, with the danger that threatens us from the destruction of the environment, it is all too clear. The cause for this destruction is the powerful influence of these two assumptions: the desire to conquer nature and the drive for material wealth. Together they place mankind firmly on the path to manipulating, and as a result destroying, nature on an ever-increasing scale. These two influences are also the cause for mankind's internal struggles, the contention to amass material comforts. It might even be said that modern man has had to experience the harmful consequences of the past century of industrial development principally because of the influence of these two assumptions.

Behind the prosperity ...

These two assumptions are not the whole picture. There are also two major trends which have served to support them:

1. Specialization: The Industrial Age is the age of specialization. Learning has been subdivided into specialized fields, each of which may be very proficient in its respective right, but on an overall level they lack integration.

The purpose of the specialization of learning is to obtain knowledge on a more detailed level, which can then be brought together into one integrated whole, but the specialists have become blinded by their knowledge, producing an unbalanced kind of specialization. In the field of science there are those who feel that science alone will solve mankind's problems and answer all his questions, which gives them little inclination to integrate their learning with other fields of knowledge.

This kind of outlook has caused the belief that religion and ethics are also specialized fields of learning. Modern education reduces ethics to just another academic subject. When people think of ethics, they think, "Oh, religion," and file it away in its little compartment. They aren't interested in ethics, but when it comes to solving the world's problems, they say, "Oh, my discipline can do that!" They don't think of trying to integrate their learning with other disciplines. If they really were capable of solving all problems as they say, then they would have to be able to solve the ethical ones, too. But then they say that ethics is a concern of religion, or some other specialized field. This brings us to the second trend:

2. The belief that ethical problems can be solved without the need for ethics. Supporters of this idea believe that when material development has reached its peak, all ethical problems will disappear of their own accord.

According to this view, it is not necessary to train people or to develop the mind. This is a line of reasoning which has recently appeared in the field of economics. Economists say that when the economy is healthy and material goods are in plentiful supply, there will no longer be any contention, and society will be harmonious. This is to say in effect that ethical or moral problems can be solved through material means.

This is not entirely wrong. Economic situations do have a bearing on ethical problems, but it is a mistake to oversimplify the situation by believing that ethical problems would somehow disappear of their own accord if the economy were healthy. It might be said, however, that this line of reasoning is true in one sense, because without morality it would be impossible for the economy to be healthy. It could also be said that if ethical practice was good (for example, people were encouraged to be diligent, generous, prudent, and to use their possessions in a way that is beneficial to society), then economic problems would disappear.

The statement, "When the economy is good, ethical problems will not arise," is true in the sense that before the economy can be healthy, ethical problems must be addressed. Similarly, the statement, "When ethical problems are all solved, the economy will be healthy," is true in the sense that before ethical problems can be solved, economic problems must also be addressed.

The phrase "ethical problems" takes in a wide range of situations, including mental health and the pursuit of happiness. Thus, the attempt to solve ethical problems through materialistic means must also entail dealing with moods and feelings, examples of which can be seen in the synthesization of tranquillizers to relieve stress and depression. But it would be a mistake to try to solve ethical problems through such means. This kind of relief is only temporary, it soothes the problem but does not solve it.

Many branches of academic learning strive to be recognized as proper sciences, but the specialist perspective causes funnel-vision and

discord, and in itself becomes an impediment to true science. Specialization is inimical to true science. Even physics cannot be called true science, because it lacks integration; its facts are piecemeal, its truth is partial. When truth is partial, it is not the real truth. Without the whole picture, our deductions will not be in accordance with the total reality. The stream of cause and effect is not seen in its entirety, so the truth remains out of reach.

These two trends, specialization and the belief that ethical problems can be solved through material means, pervade the Age of Industrialization. Coupled with the two assumptions previously mentioned, they intensify problems accordingly.

Many of the points I have mentioned so far come within the domain of religion, and in order to see this more clearly, I would like to enter the subject of religion itself. I have been speaking about science, its origins and development, now let us take a look at the origins and development of religion and try to integrate the two.

Footnote:

1. Encyclopaedia Britannica, 15th Ed., (1988), s.v. "Science, the History of," by L. Pearce Williams (vol. 27, p.37). [Back to text]

Chapter 2

Religion and Science

From common beginnings to separation

It is commonly asserted that religion arose from the fear of danger, particularly natural dangers, such as lightning, floods, earthquakes, volcanic eruptions, and hurricanes. These dangers have threatened human beings throughout the ages. Ancient man, ignorant of the workings of nature, could not understand the causes of these natural forces. Terrified at the threat they presented, he began to search for answers. This quest precipitated an interest in the nature that surrounded man, and a desire to find some solutions to his problems.

This awareness of danger is the common origin of both religion and science. The desire for security was the motivating force for the birth of religion. Together with the fear of danger arose a sense of wonder at the marvels of nature, which led to the desire to know its truths. This was no idle curiosity: human beings were forced to find out about nature in order to address the dangers which threatened them. Thus the aspiration to be free of danger, which was based on fear, indirectly led to the desire to know nature's truths, which gave birth to science. Religion was born from the desire to escape danger, and science was born from the desire to know nature's truths.

History tells us that the earliest forms of scientific research, in such cultures as in Egypt and Mesopotamia, were in fact conducted by priests. They were the first people to take an interest in nature and to devote time to finding solutions to the dangers that threatened them.

However, the common origin of science and religion is also the point at which they parted. The reason they parted lies within the nature of truth itself. The natural dangers which threaten humanity are immediate

concerns, matters of life and death. The threat is tangible and urgent. Do what you will, we must have an answer right now. Because all people are faced equally with the same dangers, answers must be relevant to the whole of society. In such a situation, it is necessary to come up with answers which can be acted upon immediately, answers which put an end to the urgent demands for security. When an answer appears that is acceptable, it is institutionalized as religion.

The practical answers thus provided may take forms, such as mystic ceremonies, which to the modern eye would seem absurd, but even so, they are something which can be acted upon immediately. For the mainstream of society, this is what becomes religion.

Now there are others who take the time to gradually collect facts, experiment and analyze. These people, through observation and experiment, arrive at a different set of answers. This is what is known as "science," the knowledge that comes from gradual and systematic observation.

Here religion and science diverge. One answer serves as a remedy for an immediate need, for the masses, and, relying heavily on faith and belief, lacks systematic observation. This is religion. Religion, then, is tied to faith. Science, on the other hand, is a discipline of gradual and systematic investigation. It is not concerned with finding immediate answers, and is available only to the few who are so inclined, not the whole of society. The systematic observation of natural facts has been carried on through the ages by interested parties, and the resulting institution has become known as "science."

At this juncture we have one clear distinction between religion and science: religion is for the masses, whereas science is for a select few. It may be questioned how religion manages to maintain uniformity in the letter and the practice of its teachings. This is achieved through faith. Religion has its roots in faith, and uses faith to preserve its teaching. Religion provides an unchanging belief system, a dogma, which must be adhered to and upheld, one that is unquestionable.

Science is accessible to those who are capable of understanding it, the thinkers. Its essence is preserved through verifiable truths and valid methods of experimentation. Science thus preserves and propagates its truths through wisdom, or, more specifically, the scientific method.

Religion seeks to convey an all-embracing, absolute truth, an answer which addresses an immediate need. It might be more accurate to say that the answer thus provided is what becomes known as religion, rather than that religion provides the answer. There is no institution of religion, as such, which comes up with these answers. It is rather that the answers proposed by humanity have become institutionalized as religion.

In one sense, religion seeks to provide one absolute answer to the fundamental questions of life, covering all levels, from the highest to the lowest. Science, on the other hand, attempts to observe truth from its individual manifestations, piece by piece. It is a collection of piecemeal facts which are hoped will gradually lead to an overall picture.

Even though science, too, wants general principles, its general principles are conditional. They are confined to specific situations and conditions, and are only part of the overall, or fundamental, truth. We could say that religion gives a total answer, science a piecemeal one.

Owing to the limitations of both science and religion, there arose a third group which, too, aspired to find answers to the fundamental questions of life and the universe. They were dissatisfied with religion because, although it gave such an answer, it was not one that appealed to reason. Science, on the other hand, although providing answers that were verifiable and appealed to reason, had not yet come up with any absolute answers. Scientific research had still not reached the fundamental level of reality. This third group did not want to wait for science's answers, so they attempted to find answers to those fundamental questions through reasoned analysis, without the need for verification. This system of thought became another science, known as philosophy.

We could compare these three disciplines, using the fundamental questions of nature as a measuring stick, in this way:

1. Science: is still in the process of verification and observation and is yet to come up with an answer.

2. Philosophy: attempts to give an answer pending verification by using reasoned analysis.

3. Religion: provides an absolute answer which needs no verification.

Both science and philosophy appeared after religion, and both attempt to give clearer answers. However, both of them fail to give answers that are satisfactory and fulfilling for everyday life, and that is why religion still exists and answers a need through faith.

Because religion offers this comprehensive and immediate truth, an answer that is suitable for the masses, but which at the same time is not verifiable through any of the five senses, it must hinge on faith. And because these answers are unverified, they will be constantly changing. At one time one kind of answer is given: people don't know whether it is true or not, because it can't be verified. If they believe it they accept it. At a later time a new answer is given. Nobody knows whether this new answer is true or not either -- it, too, can't be verified. It boils down to preference. Some prefer the older belief, some the newer one. Religions, built as they are on faith, vary in accordance with that faith. For this reason we can see at any one time many different religions. This is because an all-embracing, absolute answer cannot be verified, it rests on belief. When a new answer arises there may be some who believe that, but others won't, and all the answers are equally unverifiable.

In contrast, science answers slowly and methodically, verifying each point as it goes. It solves problems rationally. At any given time there is only one science. It is often said, "There are many religions, but only one science." However, from a historical perspective it can be said that there are many sciences, because science doesn't give a total view of truth. Theories about the nature of the universe vary from time to time. For example, at one time science favored the Ptolemaic universe, which portrayed an earth-centered model. Then came the Copernican System, with the heliocentric solar system, and then there were the Cartesian and Newtonian systems, and now we have the universe of the new physics. Science's picture of reality has been constantly changing. Nature, or the universe, according to the modern theories of physics, whether the quantum or relativity theories, is completely different from the universe in the time of Newton. In this sense there have been many sciences.

It is not only from the historical perspective that there have been

many sciences. In the present age there also seem to be many sciences existing together. There are scientists who now say that the time has come for science to reappraise some of its basic premises. They reject some of the old scientific premises and talk of a "new physics" and a "new science."

Science deals with the outside world, which is measured by the five senses. Here religion differs yet again. It not only looks at the outside world, but also the human being, the one who is observing. While science concerns itself solely with the objects of observation, religion concerns itself with the observer, the one who is using these five sense bases. Thus, religion is not confined to data observable through the five senses, but is directly related to the level of development of each individual. The way religion is perceived is directly related to the level of mental development of the perceiver, which gives it an added level of complexity.

In any case, as far as religion goes, even though it lays emphasis on the human being, it does so only insofar as the human being is experiencing a problem, and that problem needs to be dealt with. When looking for the causes of that problem, however, most religions look, like science, to the external environment. In this respect, most religions are similar to science: they look to the external natural world as the source of problems or suffering.

Religion's search for truth is in order to solve the human problem, while science's search for truth is in order to satisfy the thirst for knowledge. For most religions, which are compelled to have ready answers, the causes of problems, whether internal or external, are seen as existing behind that natural world, in the form of spirits, deities, gods or other supernatural forces. For external disturbances, such as lightning, earthquakes and so on, sacrifices and prayers are prescribed. For internal disturbances, such as sickness, mental disease or hysteria, mediums or spirit healers perform mystic ceremonies. Meanwhile science, not being compelled to find any immediate remedies, slowly and systematically goes about its search for data.

The natural religions, Buddhism in particular, have a special interest in the human condition, but they do not see the source of problems entirely in the external world. Buddhism looks for the source of problems within the entire process of causes and conditions -- including those within the human being, such as wrong ways of thinking -- be they internal or external, material or immaterial, physical or mental.

Among ordinary religions, there are many that teach the treatment of problems by appropriate means, through morality or ethics, which seems to indicate an understanding of the internal factors contributing to them, but this is not necessarily the case. In fact, such practice is often done not with real understanding of these factors, but out of obedience to some external, supernatural force. The relationship is one between mankind and an external power. Ethical behavior in these religions is usually done in order to avoid punishment, or to gain favors or blessings, rather than through awareness of the factors occurring in the natural processes.

Religions, many and varied at the one time, address the needs of different levels of people. At any one time society consists of many different levels of virtue and understanding, thus the need for many religions, answering many different levels of need.

In the past, scientific truths were verifiable through the five

senses, but this is no longer the case. With the passage of time it has become necessary to develop instruments, such as the telescope and the microscope, to extend the capabilities of these senses. Nowadays even those instruments have reached their limits, making it necessary to develop even more complex instruments and test hypotheses with mathematics. Mathematical languages and computers are the newest instruments of verification.

Science's development of increasingly complex means of verification has caused it to become a highly specialized field, accessible to very few people. It has become impossible for the average man to observe the truths of science, because the instruments are not available to him.

Religion, on the other hand, belongs to the masses. It is available for the average man, who is free to accept or reject it without the need for proof. Although it is true that some religions, like science, reserve their truths for a select few, the priests or monks, and even reserve the right to spiritual attainments, this is more a result of manipulations by certain individuals than the nature of religions themselves. In the natural religions, such as Buddhism, there is no such distinction or exclusion, because nature is its own master. How can truth be monopolized? Each individual has a right to understand and attain the truths of nature, depending on intelligence and discernment.

Note that there are two kinds of inability to verify truths. One is through an inability to access the instruments of verification, while the other is because such truths cannot be verified through the means being used. In the present time science is experiencing problems on both counts, especially when attempting to make a statement of ultimate truth, or delving into the realm of the mind.

If the scope of science is not broadened, it will arrive at a dead end. In science there is a very strong aspiration to answer the fundamental and ultimate questions of the universe, but we never seem to get near them. Just as scientific research seems to be getting on the verge of an answer, the truth seems to slip beyond reach once more.

A clarity that is not free of confusion

In addition to the new science and the classical science, or the new physics and the classical physics, we have one science for the specialists and one for the average man. Many of the concepts spoken of in science are completely beyond the ability of the average man to visualize. Not only can he not verify them for himself, he can't even grasp the concepts in question. And this applies not only to the average man: some of the concepts of science are even beyond the ability of most scientists to visualize! One can only take their word for it.

Let us take an example. According to science, light is at once a wave and a particle. Scientists were trying to define the nature of light itself: it's a particle, right? One group said, "Yes, that's right. It's a particle, a stream of photons." But another group said, "No, light is a wave." In the end it seems that it is both a particle and a wave. But what's that? It has to be proven with mathematics. This kind of thing is beyond the grasp of the ordinary human mind.

Let's look at some more examples: astronomers tell us that there are black holes scattered throughout the universe. These are stars with such extremely high gravitational pulls that even light cannot escape them, they are absolutely dark. Now what does the average man make of that? Something that even light cannot escape from?! Now they say that

in these black holes both matter and energy are compacted to such terrific densities that nothing on this earth of ours can compare. As an illustration, they say that if all the empty space were somehow pressed out of a skyscraper, like the Empire State Building, 102 stories high, its mass and energy could be compacted into the size of a needle! A skyscraper! Now what is the man in the street going to make of that?

Scientists say that this is how a black hole is. In fact it's even stranger, because, apart from being the size of a needle, at the same time it would still weigh as much as the original Empire State Building. It's inconceivable -- all we can do is believe them. We've trusted the scientists for so long, we give them the benefit of the doubt. But deep inside we're all wondering, "Huh? How is that possible?"

Science is not yet able to provide an explanation of the totality of life and the world, it is still engaged in the process of collecting and verifying pieces of data. It can still not explain many of the basic questions of the universe, such as the nature, or even existence, of the basic particle.

Science has gone beyond the point where it can be proven with the five senses. Hypotheses are proven through mathematics, which is then interpreted by physicists. The truth is reduced to algebraic equations, which are not in themselves the truth, and don't really clarify the truth in a convincing way. Mathematical symbols have become the new objects of faith. They are interpreted without a direct awareness of reality, which is very nearly the condition that Sir Arthur Eddington spoke of. Sir Arthur Eddington was an English scientist, credited with being the first person to devise a way to prove Einstein's Theory of Relativity, on account of which he was knighted. He said:

"Science is incapable of leading mankind directly to the truth, or reality as such, it can only lead him to a shadow world of symbols."[2]

Even observable phenomena are not a certainty. Scientists use the scientific method as a means of testing their observations. The main factors of this method are observation and experiment, which must be done until there is no longer room for doubt. But, even then, the matter is not closed, because of the limitations of the experimental method and the instruments used.

Let's take as an example Newton's Law of Gravitation. This was a universally accepted truth, a Law, until Einstein came along and said it was not entirely correct. On the subatomic level, the Law of Gravity no longer applies. In Newton's time, however, there were no instruments to observe the subatomic level. Mankind had to wait until the twentieth century and the arrival of Einstein, using mathematical equations and reasoning, to perceive this truth. So we must be careful. You cannot ultimately believe even experimentation.

I am reminded of the story of the chicken and Farmer Brown. Every morning that the chicken sees Farmer Brown, Farmer Brown is carrying some food for him. He sees this every single morning, so it follows that whenever he sees Farmer Brown the chicken gets fed. Chicken sees Farmer Brown = gets fed ... this is the equation. But there comes a morning when the chicken sees Farmer Brown and doesn't get fed, because Farmer Brown isn't carrying food in his hand, he's carrying a knife. The equation "Chicken sees Farmer Brown = gets fed" becomes "Chicken sees Farmer Brown = gets throat cut." So it seems that even verification based on repeated observation cannot be completely trusted, it's still not a foregone conclusion.

Towards a unity of science and religion

Science is of little direct use to the masses. The function through which science should really help the people is in the field of understanding, but the role it in effect plays is by and large through technology, which does not improve understanding by any means. In what direction does technology assist humanity? Mostly in consumption, often nourishing greed, aversion, or delusion. Television is invented, and so we are able to watch that. But when people watch television they don't look at things which are going to increase their understanding and intelligence, they prefer to look at things which make them more indulgent and heedless. We have communications technology, but rather than using it for developing wisdom and discernment, it is too often used to encourage delusion.

Science takes no responsibility for the uses its knowledge is put to, leaving technology to help the masses. Technology, however, doesn't always help; sometimes it is downright harmful. As I said, instead of becoming a tool to create benefit, it becomes a tool for seeking personal gain. Thus, science leaves the people in the hands of religion. Who can you blame? One may ask, "Why does religion make people so gullible?" but then it can be countered, "Why does science abandon the people to religion?"

Very few people have access to the more profound levels of science. All most people can do is believe it, they can't really know it. Nowadays science has become more and more a matter of faith, not knowledge, which puts it on much the same standing as most religions.

When science is finally able to arrive at the truth, to answer mankind's ultimate questions, it will be perfected. Many religions will no longer be sustainable. Conversely, a religion which points to the highest truth, to reality, will be in a position to unify with science. At that time science and religion will have reached another meeting point, their last one, where religion becomes science and science becomes religion, the division between the two gone forever.

Too little, too late

The real-life problems in society are in need of an immediate answer or remedy -- now, in this present life. As individuals we are only on this earth for a limited time. The situations threatening us give no time for procrastination.

Even though science is capable of providing many efficient ways of answering our problems, it is hampered by being "too little, too late." By being "too little," I mean that the knowledge of science is insufficient to solve the fundamental problems of life. It cannot make people good, it cannot make them happy, it cannot show them how to rectify bad habits, it cannot heal suffering, sadness, anger, sorrow, depression and so on. It can't even solve social problems.

Scientists may counter that science has helped in many ways. People with insomnia, depression and mental problems are all helped by drugs. Science is of great benefit in these areas. It must be conceded that applied science and technology in the medical fields have helped vast numbers of people. People with severe mental problems are indeed helped to some degree by science, and scientists may even believe that in the future it will be possible to make people happy through the use of drugs. Whenever you feel unhappy, just pop a capsule and the suffering

is gone ... but this is no longer medicine, it is hedonism. Scientists may conduct research into the nature of the brain, ascertain which particular chemicals are secreted when certain emotions, such as happiness, are experienced, isolate the chemical agent and synthesize it. Then, whenever people have a feeling of depression or sadness, they can take this drug and be immediately relieved. With chemicals like this as freely available as food, people will always be happy, and never again have to experience depression.

But then again, reflecting on the dangers of chemicals, there are enough problems in the world already with food additives and pesticides, without adding any more. However, this is not the most important point. Even more important is the perspective of values, or quality of life. The objective of religion is to lead people to freedom. Freedom means the ability to be happy without the need for external agents, to be more and more independently happy and less and less dependent on externals, to develop a life free of enslavement to a mass of external trappings. But the use of drugs forces people to lay their happiness and their fate more and more into the hands of externals, making them less and less able to live with themselves.

In causing people to depend increasingly on externals, science is not unlike the ancient religions, which led people to invest their fate in the gods with sacrifices and supplications. In both cases, the happiness and suffering of human beings is offered up into the hands of external agents, and in essence they equally destroy man's independence.

This is what I mean by "too little." Science on its own is not capable of solving mankind's problems. To use Buddhist terminology, we could say that science and technology do not encourage people to have good behavior (sila), do not encourage quality in the mind, or inner well-being (samadhi) and they suffer from "funnel vision," in that they seek to amass data, but they do not provide us with the knowledge of how to lead a happy life (panna).[*]

The second objection to science is that it is "too late." Scientific truth is not whole or complete, it is not yet able to give us definitive and final answers, and there is no indication of when it will be able to do so. Scientific knowledge is constantly changing. At one time the truth is thought to be one way, later on it is found to be otherwise. If we had to sit and wait for science to come up with a final answer to the nature of the universe, we would all die first without ever finding out how to conduct our lives.

Scientists are always looking for a general principle, but they can only arrive at "sub-principles," only pieces of the overall picture. In the meantime, while we are waiting for science's explanation of fundamental truth, we are using it, through technology, to enhance our lives and pander to our desires. For the moment, it is technology that is actually giving concrete results rather than science itself. But technology cannot answer mankind's fundamental questions. For an answer to the truth (or non-truth) of the natural world, mankind must first rely on religion, using science only for the convenience offered through technological progress. This is the situation at the present time.

Religion is still present in this world because mankind is still waiting for a complete and absolute answer, one that is right for the situation and which is immediately practicable. Because such answers cannot be verified, and because science cannot verify them, most people are forced to resort to belief.

Although science has made such great advances, all it has done is expand the perceivable limits of the material world. In terms of answering mankind's fundamental questions and showing man's proper relationship and position in the world, science seems to have been running in circles and made no real progress.

Not above blunders

It is not only in the field of pure science that the problem of mistakes arises from time to time. Within the field of applied science and technology, mistakes are common. They are usually not wrongdoings as such, but blunders that arise out of ignorance, oversight or lack of circumspection.

Take for example the drug chloramphenicol. At one time this drug was very widespread. It was reputed to be a wonder drug, it seemed to cure everything. Whenever you were sick, all you had to do was just go and buy some chloramphenicol, they sold it everywhere. Later on, after about ten years, it was discovered that this drug would gradually build up in the body and cause bone marrow to cease production of blood corpuscles, and many people had died of leukemia.

Then there was the case of DDT. At one time it was thought that with DDT, our problems with the insect world were over - ants, mosquitoes... all gone. People thought that they could eradicate these creatures and no longer have to be bothered by them. Many years later it was found that DDT was carcinogenic, an insidious substance which could prove fatal even to humans. What's more, while the humans were suffering ill effects from the drug, the insect population was becoming immune to it. In time it has become less effective as an insecticide, and is now more likely to kill the human beings. Many countries have banned the use of DDT, but Thailand is still using it, even now.

Then there was the case of thalidomide. Thalidomide was a pain killer and tranquillizer which was highly praised by the medical profession. It was reputed to have passed the most rigorous tests, and was trusted so highly that it was announced as an exceptionally safe drug. It was so lauded that even the developed countries, which are normally very cautious about drugs and medicines, allowed the drug to be bought without a prescription. It was sold for about five years, up until 1961, at which time it was found that this drug, when taken by pregnant women, caused deformities in babies. Before the danger was realized and the drug recalled from the market, about 8,000 children were born deformed.

Let's take one more example, the case of CFC's (chlorofluorocarbons). This group of chemicals is widely used in refrigerators, air conditioners and "pressure-pack" spray cans, and they have been used for a long time with complete confidence. By the time we knew what was going on, these chemicals had risen up into the upper levels of the atmosphere and caused gaps in the ozone layer, causing great concern among scientists and environmentalists the world over. And so a new piece of knowledge arises -- what we thought was a good thing turns out to be not so good after all.

The emergence and development of science has undoubtedly helped to improve understanding and the human intellect, about this there is no argument. But at the same time, if we look closely we will see that it has also caused human intelligence and understanding to decline. Previously, when science was just beginning to develop, people were very impressed with its achievements. There was a great deal of

excitement over the discoveries and technological achievements of science, and people put all their hopes into science and technology. All of nature's mysteries were going to be revealed, and science would lead humanity into an age of perfect happiness. Those who wholeheartedly trusted science began to doubt religions and the answers provided by them, and many people lost faith entirely and discarded religion.

Unfortunately, the truth dealt with by science is only a partial one. It deals only with the physical world. Science has no answers to the questions dealing with internal human problems, the answers for which mankind had previously turned to religion. This renunciation of religion in modern times would not be such a big loss if by religion we simply meant the institutional forms of religion, but it means that the part of religion which deals with solving internal human problems has also been discarded. With science taking no interest in these matters, and people ignoring them, there arises a break in the stream of knowledge. The answers which had previously been provided by religions have been ignored, and mankind's mental and spiritual growth has been retarded and even, in some areas, gone into decline.

The nature of the world, life and human problems, will not allow mankind to ignore the need for religion. Fundamental, practical and immediate answers are still as much in demand as ever before. When science is seen to be incapable of providing an answer to this need, and when human beings tire of their fascination with science, they may come to their senses and remember this fundamental need within. They may then turn once more to religion for their answers. But because the stream of mental development has been interrupted, or set back, their searching will be very erratic, and a fresh start may have to be made. Indications of this can be seen in some of the religious developments in highly developed countries, where there has been a persistence of religious superstition and gullibility in spite of being surrounded by a high level of scientific sophistication.

However that may be, science is not without its merits and blessings in leading to better understanding within religious circles. The active role religion, especially in its institutional forms, has taken on occasion in suppressing the development of human intelligence is well known. Some religions have clung blindly to absurd beliefs and practices, even in the face of their own fundamental principles.

The development of science and its attitudes and methods has had some measure of good influence on religions and religious attitudes in society. At the very least, it has prodded religions to reevaluate some of their teachings and attitudes. It has also served as a gauge with which to appraise the answers offered by different religions.

However, from the point of view of the masses, especially in countries in which outlooks and methods have been heavily influenced by science, science does not seem to have had a significantly beneficial effect on life-styles and mental well-being. Science itself is of not much interest to most people. While they look at science favorably, their belief in it is really no different from the beliefs of former generations in magical forces and the occult. It is naive, not based on knowledge. This is "scientism." When most people think of science, they look straight past it at technology, which they look on as a means for gratifying their desires. For that reason, the development of science has had little ennobling influence on the knowledge, understanding, or attitudes of society.

On the brighter side, people seem to be getting over their excitement about science and are beginning to look at their needs in relation to

religion. Many religions are addressing these needs on different levels. At the same time, some members of scientific circles are becoming aware of the limitations of orthodox science, and are expanding the horizons of their research to include more religious perspectives, which suggests the possibility of a fully-developed science merging with a fully-developed religion, together to lead humanity to reality, peace, and a life free of foolish attachments.

On the other hand, it may be that science is trying to prove what religion has already predicted. While humanity cannot wait for an answer, we must provide one of some kind, and this answer has become religion. As long as the answer is not proven, we must accept it, while science slowly and methodically tests it out. In this scenario, science is that effort on the part of humanity to prove the truths (or non-truths) of religion. Looking at it in this way, the two fields harmonize; having arisen from a common origin, they eventually merge once more.

As time goes on, the limits of the scientific method will once again be felt. Science will be unable to prove the truths presented by religion. A number of leading scientists are now beginning to realize that this final, ultimate truth spoken of by religion is beyond the reach of science at any point in time.

Footnotes:

2. Sir Arthur Stanley Eddington, The Nature of the Physical World (New York: Macmillan, 1929), p.282. [Back to text]

[*] Sila, samadhi and panna, or moral restraint, concentration and wisdom, are the threefold foundation of Buddhist training. [Back to text]

Chapter 3

Science and Buddhism: A meeting or a parting?

To talk of Buddhism we must first talk about its origins. I have suggested that the origin of religion was the fear of danger, but this is not true of Buddhism, which arose from the fear of suffering. Please note this distinction. Dealing with the origins of religion we talk about danger, but when dealing with Buddhism we talk about suffering, which has a more specific meaning. The fear of danger has its object in external factors, such as floods, earthquakes, and so on, but suffering includes all the problems experienced in life, including those within the mind.

What is suffering? Suffering is the condition of stress and conflict inherent within the human predicament. Simply speaking, suffering (dukkha) is difficulty (panha), because difficulty is what causes stress and conflict.

In the religious quest for protection from danger, people saw that in human society events were caused by human agents. They thought that there must be someone directing things in the natural world also, and so religions proposed God, a "someone," a supernatural source for all natural events. Applying the human social model to the forces behind nature, they came up with God. This is why some contemporary

psychologists, reversing a well-known Christian teaching, have said that mankind created God in his own image. Mankind reasoned that it was necessary to appease the God, just as for an earthly leader, and this gave rise to various techniques and ceremonies for paying homage to the deity.

- The essential factor in determining events in the world, according to these ancient religions, was the will of God.
- The factor which tied humanity to god or the supernatural was faith.
- That faith was demonstrated through sacrifices, prayers, and ceremonies.

So we have an overall picture here of a director of events -- the will of God; we have the human connection -- faith; and we have the method of interaction -- sacrifices, prayers and ceremonies. This is the general picture of the role of faith in most religions.

Now, let's see how these factors relate when it comes to Buddhism. As I have mentioned, Buddhism is based on the desire to be free of suffering. To be free of suffering, you must have a method. To know the method, you have to look at the source of suffering. Whereas other religions taught that the source of danger was in supernatural forces, Buddhism says that the source of suffering is a natural process which must be understood.

Suffering has an origin which is subject to the natural processes of cause and effect. Not knowing or understanding this natural cause and effect process is the cause of suffering. Buddhism delves into the origin of suffering by encouraging keen investigation of this law of cause and effect, or Law of Nature.

At this point we have arrived at the source of Buddhism. Just now I said that the origin of other religions was the awareness of danger, the origin of danger in turn being the will of God or supernatural forces; but the source of Buddhism is the awareness of suffering, and the origin of suffering is ignorance of the Law of Nature.

Now we come to redressing the problem. When ignorance of the Law of Nature is the cause, the remedy is its exact opposite, and that is knowledge and understanding of it, which we call wisdom. Up until the emergence of Buddhism, religions had relied on faith as the connection between human beings and the source of danger. Buddhism shifted the human connection from faith to wisdom, and this is a salient characteristic of Buddhism. According to Buddhism, human beings must know and understand the process of cause and effect, and treat problems according to such knowledge.

Finally,[*] the work of correcting the factors involved in the creation of suffering is a human responsibility, and lies within human potential. Responsibility for solving the problem has shifted from the will of God to human endeavor.

Three points are highly significant:

1. Theistic religions concern themselves with the source of danger, which is said to be God (or divine), but Buddhism concerns itself with the source of suffering, which is said to be ignorance.

2. The tie to this source in theistic religions is faith, but in Buddhism it is wisdom.

3. The director of results in theistic religions is a divine or supernatural power, but in Buddhism this responsibility has been placed

back into human hands, with the emphasis on human action.

The emphasis in Buddhism shifts from faith to wisdom, and this is a revolutionary change. Such wisdom begins with the desire to know, or the desire for knowledge -- before there can be wisdom, there must be an aspiration for it. But this aspiration differs from the aspiration for knowledge in science, as I will presently point out.

Another important shift in emphasis in Buddhism is from the directives of a deity to human endeavor. This is one of Buddhism's cornerstones. No matter where Buddhism spreads to, or how distorted the teaching becomes, this emphasis on human endeavor never varies. If this one principle is missing, then we can confidently say that it is no longer Buddhism.

The principle of human endeavor is expressed in Buddhist circles as the law of kamma. People may misunderstand kamma, there may be many misconceptions about it, even within the Buddhist world, but no matter how the teachings of Buddhism may vary from place to place and time to time, kamma always deals with human endeavor.

Buddhism's combination of adherence to the Law of Nature, proclaiming man's independence, and putting wisdom to the fore instead of faith, is a unique event in the history of religion. It has even caused some Western scholars to wonder whether Buddhism is a religion at all, and Western books on Buddhism often state that Buddhism is not a religion.

Summarizing, we have these three important principles:

1. a Law of Nature
2. proclaiming man's independence
3. replacing faith with wisdom

The natural religions: understanding nature through wisdom

I would like to describe here some of the basic characteristics of Buddhism. Firstly I would like to present some of the teachings from the Buddha himself, and then expand on them to see how they relate to science.

1. Adherence to the Law of Nature: Truth is the Law of Nature, something which naturally exists. The Buddha was the one who discovered this truth. At funerals, Buddhist monks chant a Sutta called the Dhammaniyama Sutta. The meaning of this Sutta is that the truth of nature exists as a normal condition, whether a Buddha arises or not.

What is this Law of Nature? The monks chant uppada va bhikkhave tathagatanam, anuppada va tathagatanam: "Whether Buddhas arise or not, it is a natural, unchanging truth that all compounded things are unenduring, stressful, and not-self." [Dhammaniyama or Uppada Sutta, A.I. 286]

Unenduring (anicca) means that compounded things are constantly being born and dying, arising and passing away.

Stressful (dukkha) means that they are constantly being conditioned by conflicting and opposing forces, they are unable to maintain any constancy.

Not-self (anatta) means that they are not a self or intrinsic entity, they merely follow supporting factors. Any form they take is entirely at the direction of supporting factors. This is the principle of

conditioned arising, the most basic level of truth.

The Buddha was enlightened to these truths, after which he declared and explained them. This is how the chant goes. This first principle is a very important one, the basis of Buddhism. Buddhism regards these natural laws as fundamental truths.

2. The interrelation and interdependence of all things: Buddhism teaches the Law of Dependent Origination. In brief, the law states:

Imasmim sati idam hoti	Imasmim asati idam na hoti
Imassuppada idam uppajjati	Imassa nirodha idam nirujjhati

Which means:

When there is this, this is; when this is not, neither is this. Because this arises, so does this; because this ceases, so does this. [As in the Natumha Sutta, S.II. 64-5]

This is a truth, a natural law. It is the natural law of cause and effect on its most basic level.

It is worth noting that Buddhism prefers to use the words "causes and conditions" rather than "cause and effect." Cause and effect refers to a specific and linear relationship. In Buddhism it is believed that results do not arise simply from a cause alone, but also from numerous supporting factors. When the conditions are ready, then the result follows. For example, suppose we plant a mango seed and a mango tree sprouts. The mango tree is the fruit (effect), but what is the cause of that mango tree? You might say the seed is the cause, but if there were only the seed, the tree couldn't grow. Many other factors are needed, such as earth, water, oxygen, suitable temperature, fertilizer and so on. Only when factors are right can the result arise. This principle explains why some people, even when they feel that they have created the causes, do not receive the results they expected. They must ask themselves whether they have also created the conditions.

Note also that this causal relationship does not necessarily proceed in a linear direction. We tend to think of these things as following on one from the other -- one thing arises first, and then the result arises afterwards. But it doesn't necessarily have to function in that way. Suppose we had a blackboard and I took some chalk and wrote on it the letters A, B, and C. The letters that appear on the blackboard are a result, but what is their cause? We might answer "a person," but we might also answer "chalk." No matter which factor we take to be the cause, it alone cannot give rise to the result. To achieve a letter "A" on a blackboard there must be a confluence of many factors -- a writer, chalk, a blackboard of a color that contrasts with the color of the chalk, a suitable temperature, the surface must be free of excess moisture -- so many things have to be just right, and these are all factors in the generation of the result.

Now, in the appearance of that letter "A," it isn't necessary for all the factors involved to have occurred one after the other, is it? We can see that some of those factors must be there simultaneously. Many of the factors are interdependent in various ways. This is the Buddhist teaching of cause and condition.

3. The position of faith: Just now I said that Buddhism shifted the emphasis in religion from faith to wisdom, so why should we be speaking about faith again? In fact faith plays a very important role in Buddhism, but the emphasis is changed. Let us take a look at how faith

in Buddhism is connected to verification through actual experience. The teaching that is most quoted in this respect is the Kalama Sutta, which contains the passage:

"Here, Kalamas,
"Do not believe simply because you have heard it.
"Do not believe simply because you have learn it.
"Do not believe simply because you have practiced it from ancient times.
"Do not believe simply because it is rumored.
"Do not believe simply because it is in the scriptures.
"Do not believe simply on logic.
"Do not believe simply through guesswork.
"Do not believe simply through reasoning.
"Do not believe simply because it conforms to your theory.
"Do not believe simply because it seems credible.
"Do not believe simply out of faith in your teacher.
[Kalama or Kesaputtiya Sutta, A.I. 188]

This teaching amazed people in the West when they first heard about it, it was one of Buddhism's most popular teachings, because at that time science was just beginning to flourish. This idea of not believing anything other than verifiable truths was very popular. The Kalama Sutta is fairly well known to Western people familiar with Buddhism, but Thai Buddhists have barely heard of it.

The Buddha goes on to say in the Kalama Sutta that one must know and understand through experience which things are skillful and which unskillful. When something is seen to be unskillful and harmful, conducive not to benefit but to suffering, it should be given up. When something is seen to be skillful, useful and conducive to happiness, it should be acted upon. This is a matter of clear knowledge, of direct realization, of personal experience -- it is a shift from faith to wisdom.

The Buddha also gave some clear principles for examining one's personal experience: "Independent of faith, independent of learning, independent of reasoned thinking, independent of conformity with one's own views, one knows clearly for oneself, in the present moment, when there is greed in the mind, when there is not greed in the mind; when there is hatred in the mind and when there is not hatred in the mind; when there is delusion in the mind and when there is not delusion in the mind." This is true personal experience, the state of our own minds, which can be known clearly for ourselves in the present moment.

4. Proclamation of mankind's independence: Buddhism arose among the Brahmanical beliefs, which held that Brahma was the creator of the world. Brahma (God) was the appointer of all events, and mankind had to perform sacrifices and ceremonies of homage, of which people at that time had devised many, to keep Brahma happy. Their ceremonies for gaining the favor of Brahma and other gods were lavish. The Vedas stated that Brahma had divided human beings into four castes. Whichever caste a person was born into, he was bound for life. There was no way to change the situation, it was all tied up by the directives of Brahma.

When the Buddha-to-be was born, as the Prince Siddhattha Gotama, the first thing attributed to him was his proclamation of human independence. You may have read in the Buddha's biography, how, when the Prince was born, he performed the symbolic gesture of walking seven steps and proclaiming, "I am the greatest in the world, I am the foremost in the world, I am the grandest in the world." [Mahapadana Sutta, D.II. 15] This statement can be easily misconstrued. One may

wonder, "Why was Prince Siddhattha being so arrogant?" but this statement should be understood as the Buddha's proclamation of human independence. The principles expounded by the Buddha in his later life all point to the potential of human beings to develop themselves and realize the highest good, and so become the most sublime of all beings. The Buddha's own enlightenment was the supreme demonstration and proof of that potential. With such potential, it is no longer necessary for human beings to plead for help from external sources. Instead they can better themselves. A human being who becomes a Buddha is revered by even the celestial beings and gods.

There are many examples of this kind of teaching in the scriptures. Consider, for example, the oft-quoted:

Manussabhutam sambuddham
attadantam samahitam ...
deva'pi namassan'ti

This means: "The Buddha, although a human being, is one who has trained and perfected himself ... Even the gods revere him." [Naga Sutta, A.III. 346; Udayitherakatha, Khu., Thag. 689]

With this principle, the human position changes. The attitude of looking externally, taking refuge in gods and deities, has been firmly retracted, and people are advised to look at themselves, to see within themselves a potential for the finest achievement. No longer is it necessary for people to throw their fates to the gods. If human beings realize this potential, even those gods will recognize their excellence and pay reverence.

This principle entails a belief, or faith, in the potential of human beings to be developed to the highest level, of which the Buddha is our example.

5. Remedy based on practical and reasoned action rather than dependence on external forces: This principle is well illustrated in one of the teachings of the Dhammapada:

"Finding themselves threatened by danger, people take refuge in spirits, shrines, and sacred trees, but these are not a true refuge. Turning to such things as a refuge, there is no true safety.

"Those who go for refuge to the Buddha, Dhamma and Sangha, who understand the Four Noble Truths by seeing problems, the cause of problems, freedom from problems, and the way leading to freedom from problems, are able to transcend all danger." [Dhammapada, Verses 188-192]

This is a turning point, a shift in emphasis from pleading with deities to responsible action. However, if unaware of this principle, people can even see the Triple Gem as simply an object of devotion, in the same way that members of theistic religions see deities.

The Triple Gem begins with the Buddha, our example of a perfected human being. This is a reminder to humanity of its potential, and as such encourages us to reflect on our responsibility for its development. By taking the Buddha for refuge, we reflect on our responsibility to develop ourselves and use wisdom to address the problems of life.

When we think of the Dhamma, we are reminded that this development of potential must be done through means which conform to the Law of Nature and function according to causes and conditions.

When we reflect on the Sangha, we think of those who have used the Dhamma (teaching) skillfully, developing and realizing their highest potential. They are living examples of the actual attainment of the truth, and, through developing ourselves in right practice, we can become one of them.

These are the Three Refuges. To believe or have faith in these refuges means that we strive to solve problems like wise human beings. This tenet compels us to use wisdom.

The way to solve problems through wisdom is:

1. Dukkha (suffering): We begin with the problem, recognizing that there is one.

2. Samudaya (the cause of suffering -- craving based on ignorance): We search out the cause of that problem.

3. Nirodha (the cessation of suffering -- Nibbana): We establish our aim, which is to extinguish the problem.

4. Magga (the way leading to the cessation of suffering): We practice in accordance with that aim.

6. Teaching only those truths which are of benefit: There are many different kinds of knowledge and many different kinds of truth, but some of them are not useful, they are not concerned with solving the problems of life. The Buddha did not teach such truths and was not interested in finding out about them. He concentrated on teaching only those truths which would be of practical benefit. This principle is illustrated in the simile of the leaves, which the Buddha gave while he was staying with a company of monks in the Sisapa forest. One day he picked up a handful of leaves from the forest floor and asked the monks, "Which is the greater number, the leaves in my hand, or the leaves on the trees?" An easy question, and the monks answered immediately. The leaves in the Buddha's hand were very few, while the leaves in the forest were of far greater number.

The Buddha replied, "It is the same with the things that I teach you. There are many truths that I know, but most of them I do not teach. They are like the leaves in the forest. The truths that I do teach are like the leaves here in my hand. Why do I not teach those other truths? Because they are not conducive to ultimate wisdom, to understanding of the way things are, or to the rectification of problems and the transcendence of suffering. They do not lead to the attainment of the goal, which is Nibbana." [Sisapa Sutta, S.V. 437]

The Buddha said that he taught the things he did because they were useful, they led to the solving of problems, and were conducive to a good life. In short, they led to the transcendence of suffering.

Another important simile was given in answer to some questions of metaphysics. Such questions are among the questions with which science is currently wrestling, such as: Is the Universe finite or infinite? Does it have a beginning? The scriptures mention ten stock philosophical questions which had been in existence from before the time of the Buddha. One monk went to ask the Buddha about them. The Buddha refused to answer his questions, but instead gave the following simile:

A man was shot by a poisoned arrow. With the arrowhead still embedded within him, his relatives raced to find a doctor. As the doctor was

preparing to cut out the arrowhead, the man said, "Wait! I will not let you take out this arrowhead until you tell me the name of the man who shot me, where he lives, what caste he is, what kind of arrow he used, whether he used a bow or a crossbow, what the arrow was made of, what the bow was made of, what the bowstring was made of, and what kind of feather was attached to the end of the arrow. Until I find out the answers to these questions, I will not let you take this arrow out." [Chulamalunkyovada Sutta, M.I. 428]

Obviously, if he were to wait for the answers to all those questions that man would not only fail to find out the information he wanted, but he would die needlessly. What would be the proper course of action here? Before anything else, he would have to have that arrowhead taken out. Then, if he still wanted to know the answers to those questions, he could go ahead and find out.

In the same way, the subject of the Buddha's teaching is human suffering and the way to relieve it. Metaphysical questions are not at all relevant. Even if the Buddha had answered them, his answers could not be verified. The Buddha taught to quickly do what must be done, not to waste time in vain pursuits and debates. This is why he did not answer such questions.

Good and evil

I have already said that most religions see the events of the world as the workings of God or supernatural forces. According to them, if mankind does not want any unpleasant events to befall him, or if he wants prosperity, he must let God see some display of worship and obeisance. This applies not only to external natural events, but even people's personal lives. The deity, God, is the Creator of the universe, together with all of its happiness and suffering. He is constantly monitoring mankind's behavior to ascertain whether it is pleasing to Him or not, and people are constantly on their guard to avoid any actions which might displease Him.

According to this standard, all of humanity's behavior can be classified into two categories. Firstly, those actions which are pleasing to God, which are duly rewarded, and which are known as "good"; and those actions which are displeasing to God, which He punishes, and which are known as "evil." Whatever God approves of is "good," whatever He forbids is "evil." The priests of the religion are the mediators who inform mankind which actions are good and which are evil, according to God's standards. These have been the accepted standards for defining good and evil in Western culture.

As for science, from the time it parted with religion it interested itself solely with the external, physical world and completely ignored the abstract side of things. Science took no interest at all in moral or ethical issues, seeing them as matters of religion, unfounded on facts, and turned its back on them altogether. People in Western countries, the countries which are technologically developed, were captivated by the advances of science. In comparison, religion's teachings of deities and supernatural forces seemed ill-founded, and so they, too, turned their backs on religion. At that time morals and ethics lost their meaning. If God is no longer important, then morals or ethics, God's set of laws, are no longer important. Many people today, especially those in scientific circles, view ethics as merely the arbitrary dictates of certain groups of people, such as priests, established at best to maintain order in society, but lacking any basis in ultimate truth.

Those branches of science which study the development of human civilization, especially sociology, and some branches of anthropology, seeing the success of the physical sciences, have tried to afford their branches of learning a similar standing, by using much the same principles and methods as the physical sciences. The social sciences have tended to look on ethics or morals as values without scientific foundation. They have tended to avoid the subject of ethics in order to show that they, too, are pure sciences void of value systems. Even when they do make studies about ethical matters, they look on them only as measurable quantities of social behavior.

The physical sciences, the social sciences, and people in the modern age in general, look on ethical principles as purely conventional creations. They confuse ethics with its conventional manifestations, a grave mistake in the search for authentic knowledge -- in trying to avoid falsehood, they have missed the truth.

Now let us come back to the subject of Buddhism. In regard to ethics, both science and Buddhism differ from the mainstream of religions, but while science has cut itself off from them, completely disregarding any consideration of ethics or values, Buddhism turns toward them, studying and teaching the role of ethical principles within the natural process. While most religions look at the events of nature, both outside of man and within him, as directed by the will of God, Buddhism looks at these events as a normal and natural process of causes and conditions. These same laws apply as much to mental phenomena as to the physical workings of nature. They are part of the stream of causes and conditions, functioning entirely at the directives of the natural laws. The difference in quality is determined by variations within the factors of the stream.

Buddhism divides the laws of nature, called niyama, into five kinds. They are:

1. Utuniyama (physical laws): The natural laws dealing with the events in the natural world or physical environment.

2. Bijaniyama (biological laws): The natural laws dealing with animals and plants, particularly heredity.

3. Cittaniyama (psychic laws): The natural laws dealing with the workings of the mind and thinking.

4. Kammaniyama (karmic or moral laws): The natural law dealing with human behavior, specifically intention and the actions resulting from it.

5. Dhammaniyama (the general law of cause and effect): The natural law dealing with the relationship and interdependence of all things, known simply as the way of things. [DA.U. 234; Dhs A. 272]

In terms of these five divisions of natural law, we can see that science has complete confidence in the dhammaniyama (the general law of cause and effect), while limiting its field of research to utuniyama (physical laws) and bijaniyama (biological laws). As for Buddhism, practically speaking it emphasizes kammaniyama (the law of moral action), although the Abhidhamma stresses the study of cittaniyama (psychic laws), in their relation to kammaniyama and dhammaniyama.

The Law of Kamma -- scientific morality

A true understanding of reality is impossible if there is no

understanding of the interrelation and unity of all events in nature. This includes, in particular, the human element, the mental factors and values systems, of those who are studying those events. Scientists may study the physical laws, but as long as they are ignorant of themselves, the ones who are studying those laws, they will never be able to see the truth -- even of the physical sciences.

On a physical level, human beings exist within the natural physical environment, but on an experiential level the world is in fact more a product of our intentions. Our daily lives, our thoughts, behavior and deeds, our communications, our traditions and social institutions are entirely products of human intentional action, which is known in Buddhism as kamma. Intention is the unique faculty which lies behind human progress. The human world is thus the world of intention, and intention is the creator and mover of the world. In Buddhism it is said: kammuna vattati loko -- the world is driven by kamma. [Vasettha Sutta, Khu., Sm., 654] In order to understand the human world, or the human situation, it is necessary to understand the natural law of kamma.

All behavior, intentional action, ethical principles and mental qualities are entirely natural. They exist in accordance with the Laws of Nature. They are neither the will of God, nor are they accidental. They are processes which are within our human capacity to understand and influence.

Please note that Buddhism distinguishes between the Law of Kamma and psychic laws. This indicates that the mind and intention are not the same thing, and can be studied as separate truths. However, these two truths are extremely closely linked. The simple analogy is that of a man driving a motor boat. The mind is like the boat and its engine, while intention is the driver of the boat, who decides where the boat will go and what it will do.

Certain natural events may occur as a result of the workings of different laws in different situations, while some events are a product of a number of these natural laws functioning in unison. A man with tears in his eyes may be suffering from the effects of smoke (physical law), or from extremely happy or sad emotional states (psychic law), or he may be suffering anxiety over past deeds (law of kamma). A headache might be caused by illness (biological law), a stuffy or overheated room (physical law) or it could be from depression and worry (law of kamma).

The question of free will

When people from the West start studying the subject of kamma, they are often confused by the problem of free will. Is there such a thing as free will? In actual fact there is no free will, in the absolute sense, because intention is just one factor within the overall natural processes of cause and effect. However, will can be considered free in a relative way. We might say it is relatively free, in that it is in fact one of the factors within the overall natural process. In Buddhism this is called purisakara. Each person has the ability to initiate thinking and intention, and as such become the instigating factor in a cause and effect process, or kamma, for which we say each individual must accept responsibility.

Misunderstandings, or lack of understanding, in relation to this matter of free will, arise from a number of more deeply-rooted misconceptions, in particular, the delusion of self. The concept of self causes a lot of confusion when people try to look at reality as an

actual condition with minds still trapped in habitual thinking, which clings fast to concepts. The two perspectives clash. The perception is of a doer and a receiver of results. While in reality there is only a feeling, the perception is of "one who feels." (In the texts it is said: "There is the experience of feeling, but no-one who feels.") The reason for this confusion is ignorance of the teaching of anatta, not-self.

Buddhism doesn't stop simply at free will, but strives to the stage of being "free of will," transcending the power of will, which can only be achieved through the complete development of human potential through wisdom.

Within the process of human development, the mind and wisdom are distinguished from each other. Wisdom that is fully developed will liberate the mind. So we have the mind with intention, and the mind with wisdom. However, this is a practical concern, a vast subject which must be reserved for a later time.

Footnote:

[*] The allusion here, and in the previous four paragraphs, is to the Four Noble Truths, for which click here. [Back to text]

Chapter 4

The Role of Faith in Science and Buddhism

Now let us take a comparative look at some of the qualities related to Buddhism, science and other religions, beginning with faith.

Most religions use emotion as the driving force for attaining their goals. Emotion arouses belief and obedience to the teachings, and emotions, particularly those which produce faith, are a necessary part of most religions. In other words, because faith is so crucial to them, emotion is encouraged. In contrast to other religions, Buddhism stresses wisdom, giving faith a place of importance only in the initial stages. Even then, faith is used with reservation, as wisdom is considered to be the prime factor in attaining the goal.

In order to clearly understand faith, it helps to analyze it into different kinds. Generally speaking, faith can be divided into two main kinds:

The first kind of faith is that which obstructs wisdom. It relies on inciting, or even enforcing, belief, and such belief must be complete and unquestioning. To doubt the teaching is forbidden, only unquestioning obedience is allowed. This kind of faith does not allow any room for wisdom to develop. Faith in most religions is of this variety. There must be belief and there must be obedience. Whatever the religion says must go, no questions asked. This feature of religion is known as dogma, the doctrine that is unquestionable, characterized by adherence in the face of reason.

The second kind of faith is a channel for wisdom. It stimulates curiosity and is the incentive for learning. In this world there are so many things to learn about; without faith we have no starting point or direction in which to set our learning, but when faith arises, be it in

a person or a teaching, we have that direction. Faith, particularly in a person, awakens our interest and encourages us to approach the object of that interest. Having faith in the order of monks, for example, encourages us to approach them and learn from them, to gain a clearer understanding of the teachings.

An example of this kind of faith can be seen in the life story of Sariputta, the Buddha's foremost disciple. He became interested in the teachings of the Buddha through seeing the monk Assaji walking on alms round. Being impressed by the monk's bearing, which suggested some special quality, some special knowledge or spiritual attainment, he approached Assaji and asked for a teaching. This is a good example of the second kind of faith.

The second kind of faith is a positive influence, an incentive for learning. It also gives a point of focus for that learning. Energies are motivated in whatever direction faith inclines. A scientist, for example, having the faith in a particular hypothesis, will direct his enquiry specifically in that direction, and will not be distracted by irrelevant data.

These two kinds of faith must be clearly distinguished. The faith that functions in Buddhism is the faith which leads to wisdom, and as such is secondary to wisdom. Buddhism is a religion free of dogma.

The second kind of faith is found in both Buddhism and science. It has three important functions in relation to wisdom:

1. It gives rise to interest and is the incentive to begin learning.

2. It provides the energy needed in the pursuit of that learning.

3. It gives direction or focus to that energy.

Apart from these main functions, well-directed faith has a number of further characteristics, which can be shown in the Buddhist system of practice. The goal of Buddhism is liberation, transcendence, or freedom. Buddhism wants human beings to be free, to transcend defilements and suffering. This freedom must be attained through wisdom, understanding of the truth, or the law of nature. This truth is as equally attainable by the disciples as it was by the Teacher, and their knowledge is independent of him. The Buddha once asked Sariputta, "Do you believe what I have been explaining to you?" Sariputta answered, "Yes, I see that it is so." The Buddha asked him, "Are you saying this just out of faith in me?" Sariputta answered, "No, I answered in agreement not because of faith in the Blessed One, but because I clearly see for myself that it is so." [Pubbakotthaka Sutta, Saim. S.V. 220]

This is another of Buddhism's principles. The Buddha did not want people to simply believe him or attach to him. He pointed out the fault of faith in others, because he wanted people to be free. This liberation, or freedom, the goal of Buddhism, is attained through wisdom, through knowledge of reality.

But how is wisdom to arise? For most people, faith is an indispensable stepping stone in the development of wisdom. (For clear thinkers, those who have what is known as yoniso manasikara,[*] the need for faith may be greatly reduced.)

In order to attain liberation it is necessary to develop wisdom, and that development is in turn dependent on faith. This gives us three stages connected like links in a chain:

Faith leads to Wisdom leads to Liberation

Faith is the initiator of the journey to truth, which in turn leads to wisdom, which in turn leads to liberation. This model of conditions is the defining constraint on faith in Buddhism. Because faith is related to both wisdom and liberation, it has two characteristics:

1. It leads to wisdom.
2. It is coupled with, and leads to, liberation.

Faith in Buddhism does not forbid questions or doubts, nor demand belief or unquestioning committal in any way. Both Buddhism and science use faith as a stepping stone on the journey to truth. Now the question arises, what kind of faith is it which leads to wisdom? It is the belief that this universe, or the world of nature, functions according to constant and invariable laws, and these laws are accessible to man's understanding. This faith is the impetus for the search for truth, but because faith in itself is incapable of leading directly to the truth, it must be used to further develop wisdom. At this stage the faith of Buddhism and the faith of science look very similar. Both have a belief in the laws of nature, and both strive to know the truth of these laws through wisdom. However, the similarity ends here. From this point on, the faith of Buddhism and the faith of science part their ways.

I have said that the source of both religion and science is the awareness of problems in life, the dangers of the natural world. In search of a remedy for this problem, human beings looked on the natural environment with trepidation and wonder. These two kinds of feeling led to both the desire for a way out of danger, and the desire to know the truth of nature. From this common origin, religion and science part their ways. Science, in particular, confines its research exclusively to external, physical phenomena. Science does not include mankind in its picture of the universe, except in a very limited, biological sense. In other words, science does not consider the universe as including mankind, and does not look at mankind as encompassing the whole of the universe.

Looking at nature in this way, science has only one object for its faith, and that is the physical universe -- the faith that nature has fixed laws. In brief we could call this "faith in nature."

But the objective of Buddhism is to solve the problem of human suffering, which arises from both internal and external conditions, with an emphasis on the world of human behavior. At the same time, Buddhism sees this process as a natural one. For this reason, Buddhism, like science, has faith in nature, but this faith also includes human beings, because human beings are a part of nature, and they encompass the whole of nature within themselves.

The faith of science has only one object, but the faith of Buddhism has two objects, and they are:

1. Nature
2. Mankind

In one sense, these two kinds of faith are one and the same, because they are both beliefs in nature, the first kind more obviously so. But the first kind of faith does not cover the whole picture, it includes only the external environment. In Buddhism, mankind is recognized as a part of nature. The physical human organism is as natural as the external environment.

Moreover, human beings possess a special quality which differs from the external manifestations of nature, and distinguishes mankind from the world around him. This is a quality peculiar to human beings. You could even say it is their "humanness." This unique quality is mankind's inner world, that aspect of nature which has an ethical dimension.

In Buddhism we believe that this abstract quality of human beings is also a natural phenomenon, and is also subject to the natural laws of cause and effect, and as such is included in natural truth. In order to know and understand nature, both the physical and the mental sides of nature should be thoroughly understood.

Bearing in mind that human beings want to know and understand nature, it follows that in order to do so they must understand the ones who are studying it. Mental qualities, such as faith and desire to know, are abstract qualities. They are part of the human inner world, and as such must come into our field of research and understanding. If mental qualities are not studied, any knowledge or understanding of nature is bound to be distorted and incomplete. It will be incapable of leading to true understanding of reality.

Although in science there is faith in nature and an aspiration to know its truths, nature is not seen in its entirety. Science ignores human values and as a result has an incomplete or faulty view of nature. The scientific search for knowledge is inadequate and cannot reach completion, because one side of nature, the internal nature of man, is ignored.

As in Buddhism, the faith of science can be divided into two aspects, and has two objects. That is, firstly there is belief in the laws of nature, and secondly, belief in the ability of human intelligence to realize those laws, in other words faith in human potential. However, this second aspect of faith is not clearly stated in science, it is more a tacit understanding. Science does not mention this second kind of faith, and pays little attention to the development of the human being. Science is almost wholly motivated by the first kind of faith.

Buddhism differs from science in this respect, in that it holds the faith in human potential to be of prime importance. Buddhism has developed comprehensive practical methods for realizing this potential, and these have come to form the main body of its teachings. Throughout these teachings, faith is based on three interconnected principles:

- the conviction that nature functions according to fixed laws;
- the conviction in human potential to realize the truth of those laws through wisdom;
- the conviction that the realization of these laws will enable human beings to realize the highest good, liberation from suffering.

This kind of faith makes a great difference between Buddhism and science. In Buddhism the search for truth is conducted in conjunction with training to develop human potential. The development of human potential is what determines the way knowledge is used, thus the probability of using knowledge to serve the destructive influences of greed, hatred and delusion is minimized. Instead, knowledge is used in a constructive way.

As for science, a one-sided faith in the laws of nature is liable to cause the search for knowledge to be unfocused and misdirected. There is no development of the human being, and there is no guarantee that the knowledge gained will be used in ways that are beneficial.

Science's search for the truths of nature does not, therefore, help anybody, even the scientists, to attain contentment, to relieve suffering, to ease tension or to have calmer and clearer minds. Moreover, science opens wide the way for undesirable values to subvert scientific development, leading it in the direction of greed, aversion and delusion. Thus, the drives to subjugate nature and to achieve material wealth, which have guided scientific development over the last century or more, have caused exploitation and destruction of the environment. If this trend continues, scientific development will be unsustainable.

It should be stressed that human beings have minds, or, more specifically, their actions are conditioned by the mental factor of intention. Faith in the laws of nature, and the desire to understand those laws, implies a value system, be it conscious or otherwise. Beliefs and attitudes will condition the style and direction of methods used for finding the truth, as well as the context and way in which that truth is seen.

According to the Buddha's teaching, the attainment of ultimate truth is only possible with a mind which has been purified of greed, aversion and delusion. Such purification requires training, a central concern of which are beliefs, attitudes and views. A search for truth blind to the assumptions on which it is based will not only be doomed to failure (because it ignores one side of reality) but will be overwhelmed by inferior values.

Simply speaking, the knowledge of scientists is not independent of values. A simple example of these secondary values is the pleasure obtained from, and which lies behind, the search for knowledge and the discoveries it yields. Even the pure kind of search for knowledge, which is a finer value, if analyzed deeply, is likely to have other sets of values hidden within it, such as the desire to feed some personal need.

In summary, we have been looking at two levels of values: the highest value and those intermediate values which are compatible with it. The highest value is a truth which must be attained to, it cannot be artificially set up in the mind. Scientists already have faith in nature. Such conviction or faith is a value that is within them from the outset, but this faith must be expanded on to include the human being, which necessarily entails faith in the highest good, simply by bearing in mind that the laws of nature are connected to the highest good.

With the proper kind of faith, commensurate secondary values will also arise, or will be further underscored by intentional inducement. This will serve to prevent values from straying into undesirable areas, or from being overwhelmed by inferior qualities.

Faith, which is our fundamental value, conditions the values which are secondary to it, in particular the aspiration to know. From faith in the truth of nature arises the aspiration to know the truth of nature. Such an aspiration is important in both science and Buddhism. From faith in the existence of the highest good and in human potential arises the aspiration to attain the state of freedom from suffering, to remedy all problems and pursue personal development.

The first kind of aspiration is the desire to know the truth of nature. The second aspiration is the desire to attain the state of freedom. When these two aspirations are integrated, the desire for knowledge is more clearly defined and focused: it becomes the desire to know the truth of nature in order to solve problems and lead human

beings to freedom. This is the consummation of Buddhism. With the merging of these two kinds of aspiration, we complete the cycle, producing balance and sufficiency. There is a clear definition for our aspiration for knowledge. It is firmly related to the human being, and directed to the express purpose of creating a noble life for the human race. This direction defines the way knowledge is to be used.

As for science, from ancient times there has been merely an aspiration for knowledge. When the aspiration for knowledge is aimless and undefined, the result is a random collection of data, an attempt to know the truth of nature by looking further and further outward. It is truth for its own sake. The scientific search for truth lacks direction. However, human beings are driven by values. Since this aspiration for knowledge is without clear definition, it throws open the chance for other aspirations, or lesser values, to fill the vacuum. Some of these ulterior aims I have already mentioned, such as the desire to subjugate nature and the desire to produce material wealth. These two aspirations have created a different kind of process. I would like to reiterate the meaning of that process: it is the aspiration to know the truths of nature in order to exploit it for the production of material wealth. This process has been the cause of innumerable problems in recent times -- mental, social, and in particular, as we are seeing at present, environmental.

The thinking of the industrial age has taken advantage of science's oversight, an undefined aspiration for knowledge, and led to human action without consideration for the human being. Looking closely, we will see that the reason science has this lack of direction is because it looks for truth exclusively in the external, material world. It does not search for knowledge within the human individual. Science is not interested in, and in fact ignores, human nature, and as a result has become an instrument of industry and its selfish advances on the environment.

Ignorance of human nature means ignorance of the fact that pandering to the five senses is incapable of making humankind happy or contented. Sensual desire has no end, and so the need for material resources is endless. Because material goods are obtained through exploitation of nature, it follows that the manipulation of nature is also without end and without check. Ultimately, nature will not have enough to satisfy human desires, and in fact the exploitation of nature in itself gives man more misery than happiness.

Man-centered versus self-centered

Just now I mentioned some important common ground shared by Buddhism and science in regard to faith and aspiration for knowledge. Now I would like to take a look at the object of this faith and aspiration, which is reality or truth. Our aspiration and our faith are rooted in the desire for truth or knowledge. Having reached the essential truth of nature through knowledge, our aspiration is fulfilled.

In Buddhism the goal is to use the knowledge of truth to improve on life, to solve problems and attain perfect freedom. The goal of science, on the other hand, is the utilization of knowledge for the subjugation of nature, in order to provide a wealth of material goods. This is perhaps illustrated most clearly in the words of Rene Descartes, whose importance in the development of Western science and philosophy is well known. He wrote that science was part of the struggle to "render ourselves the masters and possessors of nature."[3]

With different goals, the object of knowledge must also be different.

The prime object of Buddhist enquiry is the nature of the human being, and from there all the things with which the human being must deal. Mankind is always the centre from which we study the truth of nature.

In science, on the other hand, the object of research is the external, physical environment. Even though science occasionally looks into the human being, it is usually only as a physical organism within the physical universe. Mankind as such is not studied. That is, science may study human life, but only in a biological sense, not in relation to "being human."

So the field of the Buddhist search for knowledge is the human being, while that of science is the external world. With this point of reference, let us take a look at the respective extents of the nature that science seeks to know, and the nature that Buddhism seeks to know.

Buddhism believes that human beings are the highest evolution of nature, and so encompass the entire spectrum of reality within themselves. That is, a human being contains nature on both the physical and mental planes. Therefore, only through studying mankind is it possible to know the truth of all aspects of nature, both the physical and the mental.

Buddhism puts mankind at the centre, it is anthropocentric. Its express aim is to understand and to develop the human being. Science, on the other hand, is interested primarily in the external world. It seeks to know the truths of things outside of the human being. Over the years, however, as science incorporated the intention to conquer nature into its values, it once again put mankind at the centre of the picture, but in a very different way from the way Buddhism does. Buddhism gives human beings the central position in the sense of recognizing their responsibilities toward nature, insofar as they must develop themselves and redress problems. This outlook is of benefit, it is aimed at the transcendence of suffering, freedom and the highest good.

Science, in incorporating the view of the desirability of subjugating nature into its aspirations, places mankind in the centre of the picture also, but only as the exploiter of nature. Man says "I want this," from where he proceeds to manipulate nature to his desires. Simply speaking, science's placing of man in the centre is from the perspective of feeding his selfishness.

Having looked at the aim of enquiry, let us now consider the means or methods for attaining that aim. In Buddhism, the method is threefold.

1. Impartial awareness of sense data, awareness of things as they are.
2. Ordered or systematic thinking.
3. Verification through direct experience.

How can we ensure that the awareness of sense data will be unbiased? In general, whenever human beings cognize sense data, certain values immediately become involved. Right here, at the very first arising of awareness, there is already the problem of whether the experiencer is free of these values or not.

Buddhism stresses the importance of seeing the truth right from the first arising of awareness: when eye sees sights, ear hears sounds, and so on. For most human beings, this is already a problem. Awareness is usually in accordance with the way we would like things to be, or as we think they are, rarely as they really are. We cannot see things the way they are because of distortions, biases, and preferences. When there is

awareness of a feeling, the workings of the mind will immediately react with like or dislike. People build these reactions into habits and they become extremely fluent. As soon as an experience is cognized, these values of comfort, discomfort or indifference immediately follow, and from there to love or hate, delight or aversion. Once like and dislike arise, they influence the subsequent thought process. If there is attraction, thinking will take on one form; if there is repulsion, it will take another form. Because of this, experience is distorted and biased, awareness is false; only some perspectives are seen, not others. The knowledge that arises form this sort of awareness is not clear or comprehensive, it is not awareness of things as they really are.

In Buddhist practice, we try to establish ourselves correctly from the beginning. There must be awareness of things as they are, awareness with sati, mindfulness, neither delighting nor being averse. Experiences must be perceived with an aware mind, the mind of a student or the mind of an observer, not with a mind that is liking or disliking. In brief, there are two ways to do this:

1. Cognizing by seeing the truth: to be aware of things as they are, not to be swayed by the powers of delight and aversion. This is a pure kind of awareness, bare perception of experience without the addition of value-judgements. It is referred to in the scriptures as "perceiving just enough for the development of wisdom (nana)," just enough to know and understand the experience as it is, and for the presence of mindfulness (sati). Specifically, this is to see things according to their causes and conditions.

2. Cognizing in a beneficial way: that is, cognizing in conjunction with a skillful value, one that will be useful, rather than one that caters to sense desires. This is to perceive experiences in such a way as to be able to make use of them all, both the liked and the disliked.

This second kind of knowing can be enlarged on thus: experience is a natural function of life, but in order for the mind to benefit from experiences, we must perceive them in the proper way. There must be a conscious attempt to perceive experiences in a way that is beneficial in solving problems and leading to personal development. Otherwise, awareness will be merely a tool for either satisfying or frustrating sense-desires, and any benefit will be lost. With this kind of awareness, we perceive experiences in such a way as to make use of them. Whether experiences are pleasant, unpleasant, comfortable or not, they can all be used in a beneficial way. It all depends on whether we learn how to perceive them properly or not.

In the context of this book, where the object is knowledge of the truth, we will emphasize the first kind of awareness. In this awareness, if the wrong channels are avoided, the effects of delight and aversion do not occur, and awareness will be of the learning variety.

Clear awareness of sense data is very important. Learning must begin at the first moment of awareness -- cognizing in order to learn, not in order to indulge in like or dislike, or to feed sense desires. Although science may not openly speak about or emphasize this method, it is essential if the aim is to perceive the truth.

The second factor in attaining knowledge is right thinking. This means thinking that is structured, reasoned and in harmony with causes and conditions. In Buddhist scriptures many ways of thinking, collectively known as yoniso-manasikara, or intelligent reflection, are mentioned. Intelligent reflection is an important factor in the development of

Right View, understanding in accordance with reality. It is to see things according to their causes and conditions, or to understand the principle of causes and conditions. Some of the ways of intelligent reflection mentioned in the texts are:

a. Searching for causes and conditions: This kind of thinking was of prime importance in the Buddha's own enlightenment. For example, when the Buddha investigated the experience of pleasure and pain, he asked himself, "On what do these feelings of pleasure and pain depend? By what are they conditioned?" He saw that sense contact is the condition for feeling. Then, asking himself, "By what is sense contact conditioned?" the Buddha saw that the six sense bases are the condition for sense contact, and so on. This is an example of thinking according to causes and conditions.

b. Thinking by way of analysis: Life as a human organism can be analyzed into two main constituents, body and mind. Body and mind can both be further analyzed. Mind, for example, can be analyzed into vedana (feeling), sanna (perception), sankhara (volitional activities), and vinnana (consciousness),[**] and each of these categories can be further divided into even smaller constituents. Feeling, for example, can be divided into three kinds, five kinds, six kinds and more. Thinking in this way is called "thinking by way of analysis," which is a way of breaking up the overall picture or system so that the causes and conditions involved can be more easily seen.

c. Thinking in terms of benefit and harm: This is to look at the quality of things, both their benefit and their harm, rather than looking exclusively at their benefit or their harm. Most people tend to see only the benefits of things that they like, and only the faults of the things they don't like, but Buddhism encourages us to look at things from all perspectives, to see both the benefit and the harm in them.

These different kinds of thinking (altogether, ten are mentioned in the scriptures) are known as yoniso-manasikara, a very important part of the Buddhist way to truth. In its broadest sense, thinking also includes the way we perceive things, and so it also includes the level of first awareness, and, like those forms of awareness, can also be divided into two main groups -- that is, thinking in order to see the truth, and thinking in a way that is beneficial.

The third method for finding knowledge used in Buddhism is that of verification through personal experience. One of the important principles of Buddhism is that the truth can be known and verified through direct experience (sanditthiko, paccattam veditabbo vinnuuhi). Note, for example, the Kalamasutta mentioned earlier, in which the Buddha advises the Kalamas not to simply believe in things, but, "when you have seen for yourself which conditions are skillful and which unskillful, then strive to develop the skillful ones and to give up the unskillful." This teaching clearly illustrates practice based on personal experience.

The Buddha's life story recounts that he used this method throughout his practice. When he first left his palace in search of enlightenment, he practiced according to the methods prevalent at that time -- asceticism, yoga, trances and the rest. When he later went to live alone in the forest, the practices he undertook were all ways of experimenting. For example, the Buddha is recorded as recounting how he went to live alone in wild jungles so that he could experiment with fear. In the deep hours of the night a branch would crack and fear would arise. The Buddha would always look for the causes of the fear. No matter what posture he happened to be in when fear arose, he would

maintain that posture until he had overcome the fear. (That is, if he was walking he would continue to walk until his fear subsided; if he was sitting, standing or lying down he would continue to sit, stand or lie down until his fear subsided.) Most people would have run for their lives, but the Buddha didn't run. He stayed still until he had overcome the problem. Another example of the Buddha's experimenting was his experimenting with good and bad thoughts until he was able to give up unskillful thoughts.

The Buddha used the method of personal experience throughout his practice. Later, when he was teaching his disciples, he taught them to assess the teacher closely before believing him, because faith must always be a vehicle for the development of wisdom. The Buddha taught to closely assess teachers, even the Buddha himself, both from the perspective of whether he was teaching the truth, and also in the sense of the purity of the teacher's intentions.

The teacher's knowledge can be tested by considering the plausibility of the teaching. The teacher's intentions can be tested by considering the teacher's intentions in teaching: Does he teach out of desire for a personal reward? Is he looking for anything other than the benefit of the listener? Such assessment and evaluation should continue through all the levels of the teacher-disciple relationship.

Then there is the teaching of the Four Foundations of Mindfulness, which emphasizes insight meditation. When we are practising insight meditation, we must always consider and reflect on the experiences that come into our awareness, as they arise. Whether a pleasant feeling or unpleasant feeling arises, whether the mind is depressed or elated, the Buddha taught to look into it and note its arising, its faring and its passing away.

Even in the highest stages of practice, when assessing to see whether one is enlightened or not, we are told to look directly into our own hearts, to see whether there is still greed, hatred and delusion or not, rather than looking for special signs or miracles.

Because the emphasis and field of research in Buddhism and science differ in terms of observation, experiment and verification, results in the two fields will differ. Science strives to observe events solely in the physical universe, through the five senses, with the objective of manipulating the external physical world. In the language of Buddhism we might say that science specializes in the fields of utuniyama (physical laws) and bijaniyama (biological laws). Buddhism, on the other hand, emphasizes the study of the human organism, accepting experiences through all the six senses, including the mind. The objective of Buddhist practice is to attain the highest good and an understanding of the truth of nature. Even before the objective is reached, there is correction of problems and progress in human development. In Buddhist terminology we would say that Buddhism has its strength in the fields of kammaniyama (moral laws) and cittaniyama (psychic laws).

If it were possible to incorporate the respective fields of expertise of both science and Buddhism, to bring the fruits of their labors together, we might arrive at a balanced way for leading human development to a higher level.

Differences in methods

While on the subject of the three methods for finding knowledge, I would like to look at the differences between these methods in Buddhism

and in science.

Firstly, science uses the technique of amassing knowledge in order to find truth. This amassing of knowledge is completely divorced from concerns of life-style, whereas in Buddhism, the method of attaining knowledge is part of the way of life. Science has no concern with life-style, it seeks truth for its own sake, but in Buddhism, method is part of the way of life -- in fact it is the way of life. Consider, for example, the effect of clear awareness, without the bias of delight and loathing, on the quality of life. The Buddhist search for knowledge has great worth in itself, regardless of whether or not the goal is attained.

Science takes its data exclusively from the experiences arising through the five senses, while Buddhism includes the experiences of the sixth sense, the mind -- a sense which science does not acknowledge. Buddhism states that the sixth sense is a verifiable truth. However, verification can only really be done through the respective senses from which that data arose. For instance, to verify a taste we must use the tongue; to verify volume of sound we must use the ear, not the eye. If we want to verify colors, we don't use our ears. The sense base which verifies sense data must be compatible with the kind of data that is being verified.

If the sixth sense is not recognized, we will be deprived of an immense amount of sense data, because there is much experience which arises exclusively in the mind. There are, for example, many experiences within the mind which can be immediately experienced and verified, such as love, hate, anger, and fear. These things cannot be verified or experienced through other sense organs. If we experience love, we ourselves know our own mind, we can verify it for ourselves. When there is fear, or a feeling of anger, or feelings of comfort, peace, or contentment, we can know them directly in our own minds. Therefore, in Buddhism we give this sixth sense, the mind and its thinking, a prominent role in the search for knowledge or truth.

Science resorts to instruments designed for the other five senses, mainly the eyes and ears, such as the encephalogram, to study the thinking process. Scientists tell us that in the future they'll be able to tell what people are thinking simply by using a machine, or by analyzing the chemicals secreted by the brain. These things do have a factual basis, but the truths that they are likely to reveal will probably be like Sir Arthur Eddington's "shadow world of symbols." They will not be the truth, but shadows of the truth. Scientific truth, like the scientific method, is faulty, because it breaches one of the rules of observation: the instruments do not correspond with the data. As long as this is so, science will have to continue observing shadows of reality for a long time to come.

Now this sixth sense, the mind, is also very important in science. The scientific method, from the very beginnings right up to and including experimentation and conclusion, has developed through this sixth sense. Before any other senses can be used, the scientist must utilize thinking. He must organize a plan, a method of verification, and he must establish an hypothesis. All of these activities are mental processes, which are dependent on the sixth sense, the mind. Even in practical application, the mind must be following events, taking notes. Moreover, the mind is the arbitrator, the judge of whether or not to accept the data that arise during the experiment.

The final stages of scientific enquiry, the assessment and conclusions of the experiment, the formulation of a theory and so on, are all thought processes. We can confidently say that the theories of science

are all results of thinking, they are fruits of the sixth sense, which is the headquarters of all the other senses.

Buddhism acknowledges the importance of the sixth sense as a channel through which events can be directly experienced. The truth of the mind is a verifiable cause and effect process. It is subject to the laws of nature. Even though it may seem very intricate and difficult to follow, Buddhism teaches that the mind conforms to the stream of causes and conditions, just like any other natural phenomenon. In the material world, or the world of physics, it is recognized that all things exist according to causes and conditions, but in cases where the conditions are extremely intricate, it is very difficult to predict or follow events. A simple example is weather prediction, which is recognized as a very difficult task because there are so many inconstants. The sequence of causes and conditions within the mind is even more complex than the factors involved in the weather, making prediction of results even more difficult.

Human beings are a part of nature which contain the whole of nature within them. If people were able to open their eyes and look, they would be able to attain the truth of nature as a direct experience. Using scientific instruments, extensions of the five senses, is a roundabout way of proceeding. It can only verify truth on some levels, just enough to conquer nature and the external world (to an extent), but it cannot lead mankind to the total truth of reality.

Footnotes:

[*] Systematic attention, wise consideration, critical reflection. [Back to text]

[**] These are the four mental khandhas which, together with rupa, or material form, go to make up the whole of conditioned existence. [Back to text]

3. Rene Descartes, quoted by Clive Ponting, A Green History of the World, (St. Martin's Press, New York, 1992) p. 148. [Back to text]

Chapter 5

Approaching the Frontiers of Mind

Science, and in particular physics, has made such great advances that it can almost be said to have reached the limits of its field. At one time it was believed that scientific research would lead to an understanding of the whole universe simply through observation based on the five senses. Scientists considered that all phenomena relating to the mind were derived from matter. By understanding matter completely, the mind would also be understood. Nowadays very few scientists still believe this, because the enormous amount of knowledge amassed about matter has not led to a clearer understanding of the nature of the mind.

At the present time, concepts about the reality of matter and mind fall into two main categories, or models:

1. That the world of matter and the world of mind are like two sides of one coin. That is, they are separate, but they interact with each

other. Those who maintain this view believe that these two realities are on opposite sides, and each side must be independently studied and then integrated into one body of knowledge.

2. That the world of matter and the world of mind are like two rings. In this model, the borders of knowledge are pictured as a big ring, containing within it a smaller ring. The inner ring is limited to its own circumference, while the outer ring covers both its own area and that of the smaller one. That is, one ring surrounds the other. If the larger ring is understood, then all is understood, but if only the smaller ring is understood, such knowledge is still incomplete.

Now if, in this model, the knowledge of matter is the smaller ring, even if our knowledge covers the entire world of matter, still it is only the smaller ring that is understood. The outer ring, which includes the mind, is still not known. If, on the other hand, the outer ring is matter, then to know the truth of matter will automatically be to know everything. Now which model is more correct?

Many eminent physicists have said that the knowledge of science is only partial, it is only a beginning. In terms of the model of the two rings, it would seem that the knowledge of matter is only the inner ring, because it is limited to the five senses. Beyond these senses we arrive at the world of symbols, mathematical proofs, in relation to which we have Sir Arthur Eddington's words:

"We have learned that the exploration of the external world by the methods of the physical sciences leads not to a concrete reality but to a shadow world of symbols."[4]

Another eminent physicist, Max Planck, winner of the Nobel Prize for Physics in 1918, and regarded as the father of modern Quantum Theory, once stated that no sooner was one of science's mysteries solved than another would arise in its place. He conceded the limitations of scientific truth in these words:

"... Science cannot solve the ultimate mystery of nature. And that is because, in the last analysis, we ourselves are part of nature, and, therefore, part of the mystery that we are trying to solve."[5]

One scientist went so far as to write:

"...the most outstanding achievement of twentieth-century physics is not the theory of relativity with its welding together of space and time, or the theory of quanta with its present apparent negation of the laws of causation, or the dissection of the atom with the resultant discovery that things are not what they seem; it is the general recognition that we are not yet in contact with ultimate reality."[6]

So it has reached this stage: the most significant advance of science is the realization that it is incapable of reaching the truth. All it can lead to is a shadow world of symbols. If scientists accept this, then it must be time to choose a new path: either to redefine the scope of science, or to expand its field of research in order to attain a more holistic understanding of nature.

If scientific research remains limited to its original scope, it will become just another specialized field, incapable of seeing the overall picture of the way things are. If, on the other hand, science is to lead mankind to a true understanding of nature, it must expand its field of thought by redefining its fundamental nature and transcending its present limitations.

The material world: science's unfinished work

Fundamental questions remain unanswered, even in the world of matter, in which science specializes. There are still many things that science cannot explain, or were once taken to be understood but which now are no longer on sure ground. One example is the "quark." The quark is taken to be the most basic constituent of matter, but whether it really is or not is still open to question. At present it is believed to be so, but the possibility that there is a more fundamental particle cannot be dismissed. In fact, the very existence of the quark has not been conclusively proven. The same applies with quanta, fundamental units of energy. Once again, these are not irrefutably known to exist, they are only understood or believed to exist.

We are still not sure that matter and energy are like two faces of the same thing. If that's the case, then how can they be interchanged? Even light, which scientists have been studying for so long, has still not been clearly defined. The fundamental nature of light is still considered to be one of the deeper mysteries of science. Light is an energy force that is at once a wave and a particle. How can this be so? And how can it be a fixed velocity when, according to the Theory of Relativity, even time can be stretched and shrunk? The electromagnetic field is another mystery, another form of energy which is not yet clearly defined as a wave or a particle. Where do cosmic rays come from? We don't know. Even gravitation is still not completely understood. How does it work? We know that it's a law, and we can use it, but how does it work? We don't know. And the Theory of Relativity tells us that the space-time mass can be warped. How is that? It is very difficult for ordinary people to understand these things.

All in all, science still does not clearly know how the universe and life came about. The ultimate point of research in science is the origin of the universe and the birth of life. At the present time, the Big Bang Theory is in fashion. But how did the Big Bang occur? From where did the primal atom originate? The questions roll on endlessly.

In short, we can say that the nature of reality on the fundamental level is still beyond the scope of scientific research. Some scientists even say that there is no way that science will ever directly know the fundamental nature of reality.

It might be said that the fundamental truth will naturally continue to elude us if we confine our research to the material world. Even the most fundamental truth of the physical universe cannot be understood by searching on only one side, because in fact all things in the universe are interconnected. Being interconnected, looking at only one side will not lead to a final answer. The remaining fragment of the mystery might exist on the other side of reality, the side that is being ignored.

There will come a time when science will be forced to take an interest in solving the riddles of the mind. Many scientists and physicists are in fact beginning to look at the mind and how it works. Is the mind merely a phenomenon which arises within the workings of matter, like the functions of a computer? Can a computer have a mind? Numerous books have been written on this subject.[7]

Some people say that, on one level, even the Theory of Relativity is simply a philosophical concept. Space and time depend on consciousness. Mundane perceptions of form and size are not merely the workings of the sense organs, but are also a product of interpretation. Eye sees form, but it doesn't know size or shape. The apprehension of size and shape are functions of the mind. Thus, awareness of the material world is not

limited to the five senses, but includes mental factors.

It is the mind which knows science, but science has yet to discover the nature of the mind, which it must do if science is to reveal the ultimate truth. Doubt will not be dispelled until science takes an interest in the field of mind. The problem of whether mind and matter are one and the same or separate things will come to the fore. This problem has existed since the time of the Buddha, and is related in the abyakata panha (questions the Buddha wouldn't answer).

Nowadays, leaders in the field of science seem to be divided into four main approaches to the nature of reality.

The first approach is that of the orthodox or conservative scientists. They stand by their conviction that science can eventually answer all questions, and that only through science can reality be understood.

The second approach is that of a group of "new" scientists, who concede that science is not able to explain the reality of the mind. They feel that science doesn't need to become involved and are willing to leave research into the mind to other fields, such as religion.

The third approach is a that of a group of new physicists who believe that the Eastern religions can help to explain the nature of reality. They believe that the way for future of scientific research is pointed out in Eastern religions. The most well-known of these is Fritjof Capra, author of The Tao of Physics and The Turning Point.[*]

The fourth approach is that of another group of new physicists, who maintain that the material world is one level of reality contained within the realm of the mind. This is the model I mentioned earlier, of the large ring with the smaller ring inside it.

Ethics: a truth awaiting verification

Ethics is a very broad subject, one which is normally considered a religious matter, but here we will consider it in relation to science. Some people go so far as to say that good and evil are merely social conventions, almost a matter of personal preference. Such an idea seems to contain some measure of truth, when it is considered how in some societies certain actions are deemed good, but in other societies those very same actions are deemed evil.

However, the perception of good and evil as merely social conventions arises from confusion of the factors involved. It stems from:

1. A failure to differentiate between ethical principles and conventions. (A failure to differentiate between naturally good behavior (cariyadhamma) and that which a society or culture agrees on as good or appropriate behavior (pannattidhamma).) And more profoundly ...

2. A failure to see the relationship that connects ethical principles with reality. (A failure to see the relationship between good behavior and reality; namely that actions are good and appropriate when they are in harmony with the way things are.)

This gives us three levels to be considered: (a) reality, (b) ethics, and (c) convention. The differences and the relationship between these three levels must be clearly understood. The conditions involved in the stream, ranging from the qualities of good and evil, which are true conditions in reality, to good and evil actions and speech, which are

ethics, and from there to the laws and conventions of society, are always interconnected.

This threefold system of reality, ethics and regulations is very similar to the scientific system. The basis of science, pure science, is comparable to reality. Resting on this base we have the applied sciences and technology. If pure science is faulty, then the applied sciences and technology will suffer. From the applied sciences and technology we reach the third level, which is the forms technology takes, which are many and varied. One of the reasons for this is that technology seeks to work with the laws of nature in the most efficient way. The forms of technology will vary in efficiency because the extent to which they are consistent with the laws of nature varies. Those forms of technology which are most harmonious with the laws of nature, and through which those laws function most fluently, will be the most efficient, and vice versa.

Reality can be compared to pure science.

Ethics can be compared to applied science and technology.

Regulations or conventions can be compared to the forms that technology takes.

Rules and regulations are determined to organize societies. This is convention, which can be established according to preference. For example, in Thailand the regulation is that cars drive on the left side of the road, while in America cars drive on the right side. The two countries have determined different regulations. Now, which is good and which is evil? Can Thailand say that the Americans are bad because they drive on the right side of the road, or can America say the opposite? Of course not. These regulations are the standard for each country, and each country is free to make its own standards. This is convention.

However, convention is not simply a matter of preference, it is based on natural factors. Even in very simple matters, such as deciding which side of the road cars must drive, there is an objective in mind, which is order and harmony on the road and well-being for society. This is what both countries want, and this is a concern of ethics. American society wants this quality, and so does Thai society. Even though their conventions differ, the ethical quality desired by both societies is the same. In this instance we can see that although there is a difference in the regulations made, ethically speaking there is consistency.

Now the problem arises, which regulation gives better results? This is the crucial point. It may be questioned which is the more conducive to order and harmony between the regulations of keeping to the right in America and keeping to the left in Thailand, and there may be some differences of opinion, but this does not mean that societies determine these regulations merely out of preference.

This is the relationship between ethics and convention, or regulations. Regulations are made to provide an ethical result. In Buddhist monastic terms, the monks put it very simply by saying "Vinaya is for developing sila": Vinaya refers to the rules and regulations of society, but the objective of these is sila, which is good and skillful behavior.

There is an exception in cases where regulations have indeed been made out of partiality, for the benefit of a privileged few. For example, there are times when it seems that certain laws have been made to serve the interests of a select group. In this case we say that corruption

has arisen within the regulating process, which will in turn cause a degeneration of moral behavior. When the root of the legal structure is rotten, it will be very unlikely to produce a good result.

Because conventions have this common objective of ethical well-being, but their forms differ, we must learn how to distinguish clearly between ethics and conventions. Many of these differences are observable in the customs and traditions of different societies -- family customs, for example. In one society, a woman is allowed so many husbands, a man is allowed so many wives, while in other societies, the customs differ. Nevertheless, overall, the objective is order and harmony within the family, which is an ethical quality.

However, in the determining of regulations for society, administrators have varying levels of intelligence and wisdom, and their intentions are sometimes honest, sometimes not. Societies have different environments, different histories. With so many variables, the ethical result also varies, being more or less efficacious as the case may be. From time to time these regulations must be reevaluated. Conventions are thus tied to specific situations and considerations of time and place, while ethical objectives are universal.

Therefore, by looking at the situation in the right manner, even though there may be some discrepancies in the form regulations take, we can see that they are in fact the results of humanity's efforts to create a harmonious society. That is, conventions are not the end result, but rather the means devised to attain an ethical standard, more or less effective, depending on the intelligence and honesty of the people determining them.

Bearing this in mind, we can avoid the mistaken belief that good and evil are merely social conventions, or are determined by preference. We must look on regulations as our human attempts to find well-being. No matter how useful or ineffective regulations may be, our objective remains an ethical one.

The success of regulations is very much tied to the presence of a moral standard within the people who are determining them, and whether or not they have made their decisions intelligently.

Ethical principles must be based on ultimate reality or truth. That is, moral principles must be in conformity with the process of cause and effect, or causes and conditions. In the field of convention, whenever a regulation brings about an ethically satisfactory result, it has been successful. For example, if we establish that cars must run on the left or right side of the road, and this regulation is conducive to order and harmony, then we say that it has fulfilled its purpose.

Reality (saccadhamma), ethics (cariyadhamma) and convention (pannattidhamma) are abstract qualities. Because ethical qualities are tied to reality, it follows that they are factors within the whole stream of causes and conditions. Failing to understand or see the relationship and connection between reality, ethics and convention, we will not be able to enter into a thorough consideration of values, which are mental properties, and see their proper place within the laws of nature and the process of causes and conditions.

"What is" versus "what should be"

Buddhism learns the laws of nature, and then applies them to an ethical perspective. When people practice in accordance with ethics, they

receive the results in accordance with the natural law of cause and effect, and attain well-being, which is their objective. This gives us three stages: (1) knowing or realizing the truth; (2) practicing according to an ethical standard; (3) attaining a good result.

Science learns the truths of nature, but only on the material side, and then uses the knowledge gained for technology, with the objective of a life of abundance.

One path leads to a healthy life, while the other leads to abundance; one way deals with the nature of man, the other deals with the nature of material things. Science does not connect the truth to ethics, but instead, because it deals only with the material world, connects it to technology.

It is generally understood that science concerns itself exclusively with the question "What is," shrugging off any concern with "What should be?" as a concern of values or ethics, which lie beyond its scope. Science does not see that ethics is based on reality because it fails to see the connection between "What is?" and "What should be?"

Science applies itself to problems on the material plane, but on ethical questions it is silent. Suppose we saw a huge pit full of fire, with a temperature of thousands of degrees. We tell someone, "The human body is only able to withstand a certain temperature. If a human body were to enter into that fire it would be burnt to a crisp." This is a truth. Now suppose we further say, "If you don't want to be burnt to a crisp, don't go into that pit." In this case, the level of science tells us that the hole is of such and such a temperature, and that the human body cannot withstand such a temperature. Ethics is the code of practice which says, "If you don't want to be burnt to a crisp, don't go into that fire."

In the same way that technology must be based on the truths of pure science, ethics must be based on reality. And just as any technology which is not founded on scientific truth will be unworkable, so too will any ethic not founded on natural truth be a false ethic. The subject of ethics covers both "What should be?" and "What is?" in that it deals with the truth of human nature, which is that aspect of natural truth overlooked by science. For that reason, a true understanding of reality, which includes an understanding of human nature, is impossible without a clear understanding of proper ethics. The question is, what kind of reality, and how much of it, and in what degree, is sufficient to bring about an understanding of ethics?

True religion is the foundation of science

Science does not have any advice on how human beings are to live or behave. However, the origin and inspiration for the birth and growth of science was a desire to know the truth and a conviction in the laws of nature, which are mental qualities. Even the secondary values which were later incorporated into this aspiration, such as the aspiration to subjugate nature, are all mental processes. Not only the aspiration for knowledge, but even the great discoveries of science have been products of the mind. Some scientists possessed a quality we could call "intuition." They foresaw the truths that they discovered in their mind's eye before actually verifying them in the field.

Without this quality of intuition and foresight, science might have become just another baseless branch of knowledge, or largely a matter of guesswork, lacking direction or goal. Intuition has played a vital role in the history of science. For many eminent scientists it was

involved in making their most important discoveries. Some train of thought, never before thought of, would arise in the scientist's mind, initiating systematic reasoning, formulation of a hypothesis and experimentation, and eventually a new theory. All the advances of science made so far have arisen through faith, conviction, aspiration to know, intuition and other mental qualities, and in the minds of the most eminent scientists, those who made the most far-reaching breakthroughs, these qualities could be found in abundance. Even observation begins with a thought, which establishes a path of investigation, and constrains observation to the relevant framework. For example, Newton saw the apple fall and understood the Law of Gravity. According to the story, he saw the apple fall and immediately had a realization, but in fact Newton had been pondering the nature of motion for months at that time. It was a mental process in his mind, which culminated in a realization when he saw the apple fall.

This kind of thing may happen to anybody. We may be thinking of some particular problem to no avail for a long time, and then, while we happen to be just sitting quietly, the answer suddenly flashes into the mind. These answers don't just arise randomly or by accident. In fact, the mind has been functioning on a subtle level. The realization is the result of a cause and effect process.

Mind, through faith and motivation, is the origin of science; through intuition and foresight it is the drive for scientific progress; and through the goals and objectives which are envisioned and aspired to in the mind, it is the direction for science's future advancement. The search for fundamental truths is possible because the mind conceives that such truths do exist.

Having reached this point, I would like to tell you the name of the eminent scientist who inspired the title of this talk. He is none other than Albert Einstein. He didn't, however, say the exact words I have used. What he did say was:

"... in this materialistic age of ours the serious scientific workers are the only profoundly religious people ..."[8]

Einstein felt that in this age it is hard to find people with religion. Only the scientists who study science with a pure heart have true religion. He went on to say,

"... but science can only be created by those who are thoroughly imbued with the aspiration toward truth and understanding ... those individuals to whom we owe the great creative achievements of science were all of them imbued with the truly religious conviction that this universe of ours is something perfect and susceptible to the rational striving for knowledge ..."[9]

The desire to know the truth, and the faith that behind nature there are laws which are constant truths throughout the entire universe is what Einstein called religious feeling, or more specifically, 'cosmic religious feeling'. Then he went on to say,

"... cosmic religious feeling is the strongest and noblest motive for scientific research."[10]

And again:

"... Buddhism, as we have learned especially from the wonderful writings of Schopenhauer, contains a much stronger element of this..."[11]

Einstein says that Buddhism has a high degree of cosmic religious feeling, and this cosmic religious feeling is the origin or seed of scientific research. So you can decide for yourselves whether the title I have used for this talk is suitable or not.

I have mentioned this to show in what manner it can be said that Buddhism is the foundation of science, but please don't attach too much importance to this idea, because I don't completely agree with Einstein's view. My disagreement is not with what he said, but that he said too little. What Einstein called the "cosmic religious feeling" is only part of what religious feeling is, because religion should always come back to the human being, to the nature of being human, including how human beings should behave towards nature, both internally and externally. I cannot see that Einstein's words clearly include self-knowledge and benefit to the human being. However that may be, from Einstein's words it is evident that he felt that science had its roots in the human desire for knowledge, and conviction in the order of nature.

However, I don't wish to place too much emphasis on whether Buddhism really is the foundation of science or not. It might be better, in fact, to change the title of this talk, to something like ... "What would a science which is based on Buddhism be like?" This may give us some new perspectives to think about. The statement "Buddhism is the foundation of science" is just an opinion, and some may say a conceited opinion at that. And that would get us nowhere. To ask "How should science be in order to be founded on Buddhism?" would be much more constructive.

In answer, we must first expand the meaning of the word "religion" or "religious feeling" in order to correspond to Buddhism:

a. The words "cosmic religious feeling" must cover both the external natural world and the natural world within the human being, or both the physical universe and the abstract, or mental.

b. The definition of science as originating from the aspiration to know the truth must be complemented by a desire to attain the highest good, which Buddhism calls "freedom from human imperfection."

In point (a) we are extending the scope of that which is to be realized. In point (b) we are reiterating those values which are in conformity with the highest good, ensuring that the aspiration for truth is pure and clear, and minimizing the possibility of lesser values corrupting that aspiration.

With these two points in mind, we can now answer, "The science which accords with Buddhism is that which aspires to understand natural truth, in conjunction with the development of the human being and the attainment of the highest good," or, "the science which is founded on Buddhism arises from an aspiration for knowledge of nature, together with a desire to attain the highest good, which is the foundation for constructive human development."

This kind of definition may seem to be bordering onto applied science, but it isn't really. From one perspective, the natural sciences of the last age were influenced by selfish motives. This is why these alternative incentives are so important, to replace the desire to conquer nature and produce an abundance of material wealth with an aspiration for freedom from suffering.

To rephrase our definition, we could say "The science which attains a true and comprehensive knowledge of reality will be the integration of

the physical sciences, the social sciences and the humanities. All sciences will be connected and as one." Or to put it another way, "Once science extends the limits of its fundamental definition and improves its techniques for research and study, the truths of the social sciences and humanities will be attainable through the study of science."

This statement is not said in jest or carelessness. In the present day, the advances of the sciences and human society within the global environment have necessitated some cohesiveness in the search for knowledge. It could be said that the time is ripe. If we don't deal with the situation in the proper way, that ripeness may give way to putrefaction, like an overripe fruit. The question is, will science take on the responsibility of leading mankind to this unification of learning?

Knowledge of truth should be divided into two categories:

a. That which is necessary or useful, and is possible for a human being to attain within the limits of one lifetime.

b. That which is not necessary or useful. Phenomena which have not yet been verified can be looked into, but a good life should not be dependent on having to wait for their verification.

The human life-span is limited and soon comes to an end. Quality of life, or the highest good, are things which are needed within this life-span. Scientists tend to say, "Wait until I've verified this first, and then you will know what to do." This attitude should be changed. We need to distinguish between the different kinds of knowledge mentioned above. If science is to be a truly comprehensive body of learning, it must relate correctly to these two kinds of truth.

On the other hand, if science is to continue its present course, it might provide a more integrated response by cooperating with Buddhism for answers to those questions which demand immediate answers, so that the attainment of the highest good in this very life is a possibility. In the meantime, science can seek answers to those questions which, even if not answered, do not affect our ability to live in peace and well-being.

Effect of values on scientific research

The reason we need to clarify intermediate aims is that if pure science does not determine its own set of values, it will not be able to escape the influence of other interests. Outside parties with personal interests have determined science's values in the past, and these values have led to the destruction of the environment. Science has become a "lackey of industry." A lackey of industry cannot be a servant of mankind. These days some say that industry is destroying mankind, a point that deserves consideration. If scientists do not establish their own values, someone else will.

Human beings possess intention. It is one of mankind's unique qualities, one which affects everything we do. This means the search for knowledge cannot be totally without intention and values. Human beings, as the highest kind of being, are capable of realizing truth and the highest good. We should aspire to realize this potential.

As long as science lacks clarity on its position in relation to values, and yet exists within a world of values, it will have its direction determined by other interests. This may cause some scientists

to feel cheated and frustrated in their pursuit of knowledge. As long as industry is society's "star player," it will continue to exert a powerful influence over science, through its influence on government policies and financial institutions. For example, if a scientific institute submits a proposal for research in a particular field, but such research is not in the interests of industry, the industrial sector has the power to withhold support, thus pressuring the government to do likewise.

When this happens the scientists may get discouraged and end up like Sir Isaac Newton. Newton was heavily influenced by values in his research. He discovered the Law of Gravity when he was only 24 years old. However, some of his ideas clashed with the establishment of the time, and he was ridiculed. Newton was a very moody fellow, and easily hurt. He didn't like to associate with other people. As soon as people started to criticize his work, he got upset and gave it up. He wouldn't go anywhere near science for twenty-two years.

Now Edmond Halley, the scientist who predicted the cycles of the comet named after him, saw the value of Newton's work, and so he went to Newton and encouraged him to start work again. Newton, taking heart, began work on the momentous book Philosophiae Naturalis Principia Mathematica. But then, when he had finished only two thirds of the manuscript, another scientist, who, during the twenty-two years that Newton had refused to put his ideas to print, had come to an understanding of the Law of Gravity and calculus, claimed that he had discovered all of this before Newton. When Newton heard this he went off into another sulk. He wasn't going to write the book after all. He had only written two thirds of it when he gave up once more. Halley had to go to him again and give him another pep talk to coax him into continuing his work, after which he finally completed it.

This is a good example of how values can completely overwhelm a scientist, with repercussions for the whole scientific world. If Newton, who was a genius, had had a strong heart, not giving in to feelings of hurt and indignation, he may have been able to give the scientific world so much more than he did, instead of discarding his research for over twenty years.

In the present time, with the industrial and financial sectors all-powerful, scientists must adhere to their own ethics to prevent external values from overwhelming them. In this age of environmental ruin, some of the truths being discovered by scientific research may not be in the interests of some of the industrial and financial sectors. We hear statements in the USA from research teams that the greenhouse scare is unfounded, that the world isn't going to heat up. Then, at a later time, another group of researchers tells us that the first group was influenced by financial considerations from industrial sectors. The situation is very complicated. Personal advantage begins to play a role in scientific research, and subjects it even more to the influence of values.

At the very least, ethical principles encourage scientists to have a pure aspiration for knowledge. This is the most powerful force the progress of science can have. At the present moment we are surrounded by a world which is teeming with values, mostly negative. In the past, science and industry worked together, like husband and wife. Industry spurred science on, and science helped industry to grow. But in the coming age, because some of the interests of industry are becoming a problem in the natural environment, and because science is being questioned about this, scientific research may come up with facts that are embarrassing to the industrial sector, science and industry may have to part their ways, or at least experience some tension in their

relationship. Science may be forced to find a new friend, one who will help and encourage it to find knowledge that is useful to the human race.

As science approaches the frontiers of the mind, the question arises, "Will science recognize the sixth sense and the data which are experienced there? Or will scientists continue to try to verify moods and thoughts by looking at the chemicals secreted by the brain, or measuring the brain's waves on a machine, and thereby looking at mere shadows of the truth?" This would be like trying to study a stone from the "plops" it makes in the water, or from the ripples that arise on the water's surface. One might measure the waves that correspond to stones of different sizes, and then turn that into a mathematical equation, or estimate the mass of the stone that's fallen into the water by measuring the ripples extending from it. Has this been the approach of science's study of nature? The fact is, they never actually pick up a stone! If this is the case, science may have to take a look at some of the ways of observing and experimenting used in other traditions, such as Buddhism, which maintains that observation and experiment from direct experience in the mind the best way to observe the laws of nature.

Footnotes:

4. Sir Arthur Stanley Eddington, The Nature of the Physical World (new York: Macmillan, 1929), p. 282. [Back to text]

5. Max Planck, "The Mystery of Our Being," in Quantum Questions, ed. Ken Wilbur (Boston: New Science Library, 1984), p. 153. [Back to text]

6. Sir James Jeans, The Mysterious Universe (Cambridge University Press, 1931), p.111. [Back to text]

7. Roger Penrose, The Emperor's New Mind (New York, Penguin Books USA, 1991). [Back to text]

8. Albert Einstein, Ideas and Opinions (New York: Bonanza Books, 1954), p.40. [Back to text]

9. Ibid., pp. 45, 52. [Back to text]

10. Ibid., p.39. [Back to text]

11. Ibid., p.38. [Back to text]

Chapter 6

Future Directions

Too little

I would like to suggest some areas in which science could be improved upon, beginning with a discussion of "insufficiency." Science is not sufficient to remedy the problems of the modern day world. To illustrate, let us look at the situation in the environment. The problem of conservation is one of the major issues of our time, and science must play a leading role in dealing with this problem, especially in terms of research and proposals for solutions.

Scientific knowledge is invaluable. It can warn us of the dangers that exist, their causes, and the ways in which we have to deal with them. Technology is an essential tool in this work. But such valuable tools alone are not enough to solve the problem. Indeed, we may find that the problems have largely arisen from science and technology.

Science and technology are not able to correct their own handiwork. In spite of having the necessary knowledge at our disposal, we do not use it. In spite of having the technical capability to solve problems, we continue to use the kind of technology which aggravates them. Scientific knowledge is incapable of changing human behavior. Attempts to solve these problems always flounder on indecision. Science may have to open up and work in conjunction with other disciplines, by providing them with data for use in a collective effort to address these problems.

From a Buddhist perspective, any attempt to solve human problems, regardless of type, must always be implemented on three levels.

To give an example, environmental problems must be addressed on three levels:

1. behavior
2. the mind
3. understanding

These three levels must be integrated in the process of problem solving, thus:

1. On the level of behavior, there must be social constraint, that is, restraint on the outward manifestations of bodily and verbal behavior.

There are two ways to constrain behavior in society:

Firstly, restraint from without, through regulations and laws, including punishment for lawbreakers and so on. In Buddhism this is called "vinaya." The second way is restraint from within the individual, through intention. Usually such intention arises from religious faith. With belief or confidence in religion, there is a readiness and willingness to restrain behavior. In Buddhism such internal restraint is called sila.

In short, the first way is vinaya -- regulations and standards for constraining destructive actions, and the second way is sila -- the conscious intention to be restrained within the restrictions thus imposed.

Both of these levels are related in that they are concerned with the control and training of behavior. On a social level it is necessary to establish regulations, but alone they are not enough. There must also be sila, restraint from within, moral conduct that is fluent and regular.

2. In terms of the mind, since it is one of the factors involved in causing problems, solving problems by control of behavior alone is not enough. We must also deal with the mind. In our example, our aim is to conserve nature. If we want all people to contribute in the conservation of nature, we must first instill into them a desire to do so. So from "conservation of nature" we arrive at "wanting to conserve nature."

A desire to conserve nature is dependent on a love of nature. With an

appreciation of nature, the desire to conserve it will naturally follow. But that's not the end -- people will only appreciate nature when they can live happily with nature. It seems that most people have realized the importance of appreciating nature, but if that is all they see they are not seeing the whole chain of conditions. Failing to see all the factors involved, their attempts to address the problem will also fail. We must search further down to find the beginning of the chain, to see what needs to be done to encourage people to appreciate nature.

A love of nature will arise with difficulty if people are not happy living with nature. Our minds must be at ease living with nature before we can love nature, and we must love nature before we can a develop a desire to conserve nature, which is a necessary prerequisite for the actual work of conservation.

Even though there may be other factors, or some discrepancies, in our chain of conditions, this much is enough to convey the general idea. It seems, though, that so far scientific work has obstructed this process from taking place. The desire to seek happiness from the exploitation of nature has caused people to feel, deeply within, that they can only be happy through technology, and that nature is an obstacle to this happiness. Many children in the present day feel that their happiness lies with technology, they do not feel at all comfortable with nature. They may even go so far as to see nature as an enemy, an obstacle to their happiness. Nature must be conquered so that they can enjoy the happiness of technology. Take a look at the minds of people in the present age and you will see that most people in society feel this way. This is a result of the influence of science in the recent Industrial Age.

The beliefs in conquering nature and seeking happiness in material goods, which are represented and advocated by technology, have held sway over the minds of human beings for such a long time that people have developed the feeling that nature is an enemy, an obstruction to human progress. As long as this kind of thinking prevails, it will be very difficult for us to love nature. Our ways of thinking must be changed. If we are to continue living in a natural world we must find a point of balance, and in order to do that we must develop an appreciation of nature, at least to see that nature can provide us with happiness. There is much beauty in nature, and technology can be used to enhance our appreciation of it.

In order to be more effective, constraint of behavior needs to be supported by mental conviction. If there is appreciation of skilful action and a sense of satisfaction in such behavior, self-training need not be a forced or difficult process.

3. In terms of understanding, wisdom refers to an understanding of the process of cause and effect, or causes and conditions, in nature. This is of prime importance. In order to understand the pro's and cons of the issue of conservation we must have some understanding of the natural order. In this respect Pure science can be of immense benefit, providing the data which will clarify the relevant factors involved in the deterioration of the environment, in what ways the environment has deteriorated, and what effects are to be expected from this deterioration.

An understanding of the situation will open people's minds and make them receptive. If there is understanding that a certain action causes damage to the environment, and that this will in turn have a detrimental effect on human beings, there will be an incentive to change behavior.

Sometimes, however, in spite of understanding the ill-effects of something, we cannot change our behavior because the mind has not yet accepted the truth on a deep enough level. That is why it is important for the mind to have both an understanding of the situation on an intellectual level, and also an emotional feeling, an appreciation, an ability to be happy with nature. Scientific knowledge alone is not enough to induce people to change their ways, because of attachment to habits, personal gains, social preferences and so on. With enjoyment of nature as a foundation, any intellectual understanding of the ecological system will serve to deepen or fortify all qualities on the emotional level.

The methods of Buddhism are a comprehensive solution to the problem at all levels. There are three prongs or divisions of the Buddhist path. In Buddhism we call the first level sila, the constraint or control of moral behavior through vinaya, laws and regulations. Restraint of action is achieved through intention, which is the essence of sila. Both these levels, regulations and moral intention, are included under the general heading of sila, training in moral conduct.

The second level concerns the mind, training the feelings, qualities and habits of the mind to be virtuous and skillful. This division is known as samadhi, the training of the mind.

The third level is wisdom, panna, or knowledge and understanding. Wisdom is the quality which monitors the activities of the first and second levels and keeps them on the right track. On its own, wisdom tends to be inactive. It must be supported by training in moral conduct and meditation.

Wisdom not only supervises the practice of moral restraint and meditation, but also examines the negative side of things, seeing, for example, the harmful effects of unskillful behavior patterns, even when such behavior is enjoyable or profitable. If such pleasure is seen to be in any way harmful, wisdom is the voice which tells us that such behavior should be given up or corrected, and in which ways it can be done.

These three divisions work together and are interdependent. Initially we train our actions, cultivating skillful behavior and giving up the unskillful. At the same time we train the mind, instilling in it skillful drives and a feeling of joy or satisfaction in the practice. We also develop understanding of reality and the reasons for practice, seeing the benefit and harm of our actions as they are. As we train and the practice becomes more and more consistent, the mind takes joy in the practice, which causes faith to increase. When faith increases, the mind is keen to contemplate and understand our actions. When wisdom or understanding arises, seeing the benefit in practicing skillfully and the harm of not practicing, faith is enhanced once again. When faith is increased, we are more able to control and adapt our behavior and make it more in accordance with the right path.

Too late

Now we come to the quality of "too late." I would like to give an illustration of what I mean by this statement to show what it has to do with science. As an example I would like to compare the attitudes of Buddhism with the attitudes of science, which have some strong similarities.

In science we have scientific knowledge on one hand, and scientific

attitude on the other. In many cases the scientific attitude is more important than scientific knowledge. Why is this? Because the data or knowledge obtained by science has sometimes proven to be wrong and had to be corrected. This tends to be an ongoing process. This scientific attitude or objective is a constant principle, one which has been of immense benefit to human beings. Whether individual pieces of knowledge can actually be used or not is not a sure thing, but this attitude is a condition that can be used immediately and is of immediate benefit. However, the attitudes of science and Buddhism have some slight discrepancies.

Firstly, let us define our terms. What are the attitudes of Buddhism and science? Both attitudes have the same objectives, and that is to see all things according to cause and effect, or causes and conditions. On encountering any situation, both the Buddhist attitude and the scientific attitude will try to look at it according to its causes and conditions, to try to see it as it really is.

For example: You see your friend walking towards you with a sour look on his face. For most of us, seeing a sour expression on our friend's face would normally be an unpleasant sight. We would think our friend was angry with us, and we would react in negative ways. An awareness of unpleasant experience has taken place, and a reaction of dislike arises. Thinking, "He can get angry, well so can I," we wear a sour expression in response.

But with a Buddhist or scientific attitude, when we see our friend walking towards us with a sour expression, we do not look on it with an aggravated state of mind, through liking or disliking, but with the objective of finding out the truth. This is the attitude of looking at things according to causes and conditions ... "Hmm, he's looking angry. I wonder why my friend is looking angry today. I wonder if something's bothering him. Maybe somebody said something to upset him at home, or maybe he's got no money, or maybe ..." That is, we look for the real causes for his expression. This is what I call the Buddhist attitude, which is applied to mental phenomena, and which correlates with the scientific attitude, which applies to the material plane. It is an attitude of learning, of looking at things according to causes and conditions.

If we look at the situation in this way no problem arises. Such an attitude leads to the relief of problems and the development of wisdom. Searching for the causes and conditions for our friend's sour expression, we might ask him the cause or act in some other intelligent way, initiating a response which is attuned to solving the problem.

This is an example of an attitude which is common to both Buddhism and science. But how do their attitudes differ? The scientific attitude is one that is used only to gain knowledge, but the Buddhist attitude is considered to be part and parcel of life itself. That is, this attitude is part of the skillful life, it is a way of living harmoniously in society. In short, it is ethics.

The scientific attitude is one clear example of how science avoids the subject of ethics or values while in fact containing them. That is, the scientific attitude is in itself an ethic, but because science does not clearly recognize this, it fails to fully capitalize on this ethic. More importantly, science fails to see ethics as an essential factor within the process of realizing the truth of nature.

Buddhism does not use its attitude simply for the acquisition of knowledge, but incorporates it into daily life, in the actuality of the present moment. This brings us to the quality I call "too late."

Because the scientific attitude is an attitude and means simply of finding knowledge, any practical application must wait until science finds out all the answers. As long as we don't know the answers our hands are tied. If we don't yet know what something is, we don't know how we should behave towards it.

But in this world there are so many things that science does not yet have the answers for, and there's no telling when science will have the answers. In the meantime, mankind, both as an individual and as a society, must conduct life in the present moment. To put it simply, the conduct of life for human beings in a skillful and proper way, within the space of one individual life-span or one society, in real time, cannot wait for these answers from the scientific world.

The Buddhist attitude is to search for knowledge in conjunction with living life, holding that to look at things according to cause and effect is part and parcel of the process of living a good life, not simply a tool to find knowledge. Therefore, with the Buddhist attitude, whenever we meet something that is not yet known clearly to us, or has not yet been verified, we have an outlook which enables us to practice skillfully towards it. We do not lose our standard in life.

The scientific attitude seeks knowledge only, but does not give an outlook for living life. Buddhism teaches both levels, giving a path of practice in relation to things in present day life. I will give an illustration, one which has troubled mankind throughout the ages and toward which even we, as Buddhists, fail to use a proper Buddhist outlook. I refer to the subject of heavenly beings [devata].

The subject of heavenly beings is one that can be looked at in terms of its relation to verifiable truth, or it can be looked at in relation to human society, in the light of everyday life. Looking at the subject with the scientific attitude, we think of it in terms of its verifiable truth, that is, whether these things actually exist or not. Then we have to find a means to verify the matter. The subject would eventually become one of those truths "waiting to be verified," or perhaps "unverifiable." And there the matter ends, with mankind having no practical course to follow. As long as it remains unverified, it becomes simply a matter of belief. One group believes these things do exist, one group believes they don't. Each side has its own ideas. Take note that those who believe that there are no such things are not beyond the level of belief -- they are still stuck on the belief that such things do not exist. Both of these groups of people are living in the one society. As long as they hold these differing and unresolvable beliefs, there is going to be a state of tension.

In this instance, science has no recommendations to offer, but in Buddhism there are ways of practice given in graded steps. On the first level, looking for truth by experimentation, regardless of who wants to prove the matter one way or the other, there is no problem. Those who are looking for the facts are free to continue their search, either in support of the existence of heavenly beings or against it.

On the second level, finding a right attitude for the conduct of everyday life, what should we do? In Buddhism there is a way of practice which does not contradict the case either for or against the existence of heavenly beings. Our lives have a standard which is clear and can be applied immediately. We are always ready to accept the truth, whether it is eventually proven that heavenly beings do exist or they do not, and our way of life will be in no way affected by such a discovery.

Most people are easily swayed or put on the defensive because of

doubts about issues such as this, which tends to make them lean towards either one of two extreme views -- either that heavenly beings do exist or that they don't. If you believe that heavenly beings do exist, then you have to make supplications and perform ritual ceremonies to placate them. If you believe that there aren't any heavenly beings, then you must argue with those who do.

But in Buddhism we distinguish clearly between the search for facts, which proceeds as normal, and the conduct of everyday life. Our life does not depend on the heavenly beings. If there are heavenly beings, then they are beings in this universe just like us, subject to birth, aging, sickness and death, just like us. We Buddhists have a teaching which encourages us to develop kind thoughts to all beings in the universe. If there are heavenly beings, then we must have kind thoughts toward those heavenly beings.

The essential teaching of Buddhism is self-development and self-reliance. The objective is freedom. If we are practicing in accordance with the principle of self-reliance, we know what our responsibility is. It is to train ourselves, to better ourselves. The responsibility of the heavenly beings is to better themselves. So we both have the same responsibility, to better ourselves. We can coexist with the heavenly beings with kind thoughts. At the same time, whether heavenly beings exist or not is no concern of ours. In this way, Buddhism has a clear outlook on the matter, and Buddhists do not have to worry about such things.

Without this attitude, we get caught in the problem of whether these things do exist or not. If they do exist, how should we conduct ourselves? We might create ceremonies and sacrifices, which is not the duty of a Buddhist. The Buddhist responsibility is to practice to better oneself. If a human being succeeds in fully bettering himself, then he becomes the most excellent of all beings -- revered even by the heavenly beings.

This is an example of Buddhist attitude, which in essence is very similar to the attitude described in the simile of the man wounded by the poisoned arrow. If you have been pierced by an arrow, your first duty is to remove it before the poison spreads throughout the body and kills you. As for searching for data in relation to that incident, whoever feels so inclined can do so, but first it is necessary to take out that arrow.

This is very similar to the thinking of Sir Arthur Stanley Eddington. He had a similar idea, although he did not put it in Buddhist terms. He wrote:

"Verily, it is easier for a camel to pass through the eye of a needle than for a scientific man to pass through a door. And whether the door be barn door or church door it might be wiser that he should consent to be an ordinary man and walk in rather than wait till all the difficulties involved in a really scientific ingress are resolved."[12]

In Christian texts it is said that it would be easier for a camel to pass through the eye of a needle than for a rich man to go to heaven. Eddington rephrased this a little, saying that it would be easier for a camel to pass through the eye of a needle than for a scientific man to go through a door and into a room. What did he mean by this?

I stress here that Eddington is talking about a scientific man, not a scientist. The reason it would be so hard for a scientific man to enter a room is that a scientific man would have to first stand in front of the door and wonder, "... Hmm, I wonder if I should go through this

door?" He would have to consider all the physical laws. He might try to figure for example, how many pounds of air pressure per square inch would be on his body if he walked through the door, how fast the earth would be spinning at the time, how this would effect his walking into the room ... he would be thinking for ever. In the end the scientific man would find it impossible to go through the door, because he would never finish his scientific calculations. That is why Eddington said it would be even easier for a camel to pass through the eye of a needle than for a scientific man to pass through a door. He concluded that scientists should behave as normal. Whether it be the door of a church, a barn door or any other kind of door, then just to go through it.

If things continue as they are, science is in danger of becoming another kind of "higher philosophy." That is, one of those "truths" which are impossible to use in the situations of everyday life, because they are forever waiting to be verified. Pure science maintains that it is void of values, but it is well known how important the role of science has been in the development of society in recent times, even though this development has been the activity of human beings, imbued as they are with values. When we look closely at history we find that values have been exerting a subtle influence over the birth and development of science, beginning with faith and the aspiration to know the truths of nature, up until the most destructive value, the desire to conquer nature and produce an abundance of material goods.

The solution to the problem of values in science is not to try to get rid of them. It is not necessary for science to try to evade values. It is more a matter of trying to clarify the values that science does, or should, have. Otherwise, science may unknowingly become the victim of other values, values which obstruct the truth, and cause it to become a negative influence, one that could even threaten the complete destruction of the human race.

In the preceding parts of this lecture I have tried to show the connection of science to values on two levels, the highest value and the provisional value. This highest value is one that science must adhere to in order to attain to the highest truth, because the highest value is in itself the truth and thus an indispensable factor in the attainment of ultimate truth. However, this highest value, the highest good, or freedom, is an ideal, it is an objective, and as such will not exert a major influence on the quality of science in general.

The value which will have the most immediate influence over science is the secondary value, of which there are two kinds: that which is derived from, and harmonious with, the highest value; and the phony value which has infiltrated into science as a result of a lack of reflection on values.

While scientists have no understanding of values, and fail to see the relationship between them and the truth they are seeking, science will, in addition to limiting the scope of knowledge to which it aspires and rendering the search for highest knowledge fruitless, be taken over by the lesser and more counterproductive values, some inherited from previous generations, and some fed by desire and the search for happiness within the minds of present-day scientists themselves. When these inferior values dominate the mind, not only do they throw the search for true knowledge off course, but they lead to destructive tendencies, causing problems either in the immediate present, or if not, then at some time in the future.

Conversely, if scientists, or those seeking truth, realize the connection between abstract values and the physical world, they will also realize that to search for and understand natural truth is to

understand the nature of man; that for man to understand himself is to understand the nature around him. When there is this kind of realization, the secondary value which is derived from the highest value will arise of itself. It will automatically be fulfilled. When there is right understanding, the result will be twofold, namely:

1. The search for knowledge will not be limited or misdirected, but will be set straight on the course for the highest kind of knowledge.

2. The correct kind of secondary value will automatically arise and human development will proceed in conjunction with the search for knowledge.

If research is based on this right understanding, the right kind of value will automatically be present.

The highest kind of value is a condition that will be attained on the realization of truth. It is not necessary to strive to attain this value in itself, simply to bear it in mind. When this is realized, a balanced kind of secondary value, which is congruous with the highest value, will arise.

Even though in the path that is directed toward, and harmonious with, the truth, the assurance of values is not necessary, being already included in the awareness of truth, in practical terms, such as when scientific knowledge is transferred into technology, it may be necessary to emphasize some values in order to clarify the direction of research and to prevent the infiltration of inferior and destructive values. Examples of some of these positive values might be: the search for knowledge in order to attain freedom from human imperfection, or to search for knowledge in order to solve problems and further the development of mankind and even such lesser values as striving to do everything as circumspectly as possible, with minimal harmful results.

At the very least, the realization of the importance of values will enable scientists to be aware of and to understand the way to relate to the values with which they have to deal in their search for knowledge, such as greed, anger, hurt, jealousy, envy and so on, such as in the case of Newton. More importantly, they will see the benefit of a correct set of values and know how to use them effectively, even in the advancement of the search for knowledge. At the very least, scientists will have a sense of morals and not become the mere servants of industry.

One value which is of prime importance to humanity and its activities is happiness. The value of happiness lies deeply and subconsciously behind all human activities and is thus an essential part of ethics. Our conception of happiness will naturally influence all our undertakings. For example, the values of the Industrial Age saw that happiness lay in the subjugation of nature, after which nature could be used as humanity wished. This has led to the developments which are presently causing so many problems in the world.

In order to address problems successfully we must see the truth of happiness and suffering as they really are. Conversely, if we do not correct our values in regard to happiness and suffering, we will have no way of addressing the problems of human development.

To correct our definition of happiness means, in brief, to change our social values, no longer trying to find happiness in the destruction of nature, but instead finding happiness in harmony with nature. In this way we can limit the manipulation of nature to only what is necessary to relieve human suffering rather than to feed pleasure-seeking.

Mankind must realize that if he continues to seek happiness from the destruction of nature, he will not find the happiness he is looking for, even if nature is completely destroyed. Conversely, if mankind is able to live happily with nature, he will experience happiness even while developing the freedom from suffering.

Roughly speaking, there are three main values with which scientists will inevitably have to deal. They are:

1. Mundane values, which scientists, as ordinary people, have in common with everybody else. This includes incentives or motivations, both good and bad, occurring in everyday life, and also in the search for and use of knowledge. Such values include selfishness, the desire for wealth, gains, fame or eminence, or, on the other hand, altruistic values, such as kindness and compassion.

2. Values which are adhered to as principles, and which guide the direction of learning, such as the idea of subjugating nature, the values of the industrial age, the belief that happiness can be obtained through a wealth of material goods, or conversely, the principle of addressing problems and improving the quality of life.

3. The highest value, which scientists should adhere to as members of the human race, is the ideal of the human race as a whole, which, as I have said, has so far been neglected by the world of science. Science is still only half way, with an aspiration to know the truths of nature solely on an outward level. Such an aspiration does not include the matter of "being human," or the highest good.

Science has still some unfinished business to do in regard to these three values.

Encouraging constructive technology

On the level of everyday life, or satisfying the everyday needs of humanity, science plays the vital role of paving the way for technological development and encouraging the production, development and consumption of lopsided technology. On the other hand, social preferences for a particular kind of technology encourage scientific research aimed at producing, developing and consuming that technology.

From what we have seen, science, supported by the beliefs in the efficacy of conquering nature and producing an abundance of material goods, has spurred the production and development of technology along a path resulting in serious problems. Science and technology may have actually done more harm than good.

The kind of production, development and consumption of technology which has caused these problems is one geared to feeding greed (selfishly and wastefully catering to desires on the sensual plane), hatred (causing exploitation, destruction, power mongering), and delusion (encouraging heedlessness, time-wasting activities, and the blind consumption and use of technology).

In the development of science on the technological level, it will be necessary to change some of the basic assumptions it is based on, by encouraging the development of constructive technology, which is free of harmful effects, within the constraints of these three principles:

1. Technology which is moderate.
2. Technology which is used for creating benefit.

3. Technology which serves to develop understanding and improve the human being.

I would like to expand on this a little.

1. We must acknowledge the needs of the ordinary human being. Ordinary people want to be able to satisfy their desires for sense pleasures. We do not want to suppress or deny these sense pleasures. The important point is to encourage the constraint of behavior to a degree which is not destructive or extravagant, by encouraging restraint on the mind, keeping it within moderate limitations. It must be a limitation in which self-created sense desires are balanced by an awareness of what is of real benefit to and truly necessary in life. This is expressed in the words "know moderation." This value is closely related to the development of wisdom. In particular, there should be some principles governing the production, development and consumption of material goods wherein they are directed towards real benefit, aimed at bettering the quality of life rather than satisfying inferior values. In short, we can call this, "technology which is moderate," or technology which puts a limitation on greed.

2. In addition to selfishness and greed, mankind has a tendency to covet power over others, and to destroy those who oppose his desires. The human potential for hatred has found expression in many ways, causing the production, development and consumption of technology which facilitates mutual destruction more than mutual cooperation. Mankind must turn around and change this direction of development, by establishing a clear objective and creating a firm and decisive plan to encourage the production, development and consumption of goods which are constructive and beneficial to human society. This technology for benefit will help to do away with or diminish the production of technology which caters to hatred.

3. So far, the production, development and consumption of technology has mostly been of a kind which leads people to heedlessness, intoxication and dullness, especially in the present time, when many parts of the world have stepped into the Information Age. If mankind practices wrongly in regard to this information technology, it becomes an instrument for promoting heedlessness rather than an educational aid. Witness, for example, the gambling machines and video games which abound in the cities of the world, completely void of any purpose other than to waste time and money. Witness also the ignorant use of technology, without any awareness of its benefits and dangers, leading to environmental damage. These things not only degrade the environment, they also debase human dignity.

For this reason we need to effectuate a conscious change of direction -- to stress production, development and consumption of technology which promotes intelligence and development of the human being, using it as a tool for the communication of knowledge that is useful, and which encourages people to use their time constructively. There must also be conscious use of technology, with an awareness of the benefits and dangers involved in it. In this way, technology will be an instrument for enhancing the quality of life and protecting the environment. Society will become an environment which supports and encourages mental development. This third kind of technology can be called, "technology which enhances intelligence and human development," which is directly opposite to the technology which encourages delusion.

If production, development and consumption of technology can be channelled in this way, and if science opens the way to this kind of technology, then sustainable development will surely become a reality.

Footnote:

12. Sir Arthur Stanley Eddington, "Defense of Mysticism," in Quantum Questions, ed. Ken Wilbur (Boston: New Science Library, 1984), p. 208. [Back to text]