TWENTY-THREE

SCIENCE And SPIRIT

A PHYSICIST'S VIEW

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This is undoubtedly the age of science. Not only is more science research undertaken currently compared to any time in history; but most of the scientists ever born are alive today! Such an explosion of a discipline makes it essential for us to see if science today is truly different in character from science in the past: Is there a difference in the spiritual aspect of science?

In our time science is often (mistakenly) identified with science-based technology and as such science appears to the public generally in its role as high-tech enterprises including space-travel, nuclear reactors, and warheads, electronic miracles including computers and the sophisticated weapons of modern warfare, as well as its more benign forms in agricultural research and miracle drugs. All these are associated with science, but they are associated also with commerce and economics and politics.

The one essential quality of science that is often overlooked is its cultural and personal growth potential. Science is primarily an intellectual discipline where vast amounts of human experience is brought under control in a systematic fashion. It

is a way of life, a continuing endeavor; science continues to accumulate facts and theories each influencing the other. In the process the human intellect is cultured and skilled in the orderly perception of the world around and within us.

The dazzle of the technological artifacts so blinds many an eye that science as a cultural discipline, science as a fine art is overlooked. Many students in other disciplines when coming across an instructor or a course emphasizing the human cultural aspects of science are astonished at the bad press the hard sciences get. We scientists should share the blame for the distorted perception of science.

I would like to go one step further and point out that science, particularly so physics, enables a person to comprehend complex ideas. The domain of intellectual experience is enlarged. Physics provides a greater number of metaphors that can be used in other domains of human experience.

Science also provides a methodology that may be considered in other walks of life. First of all it deals with correlations, using them as a means of penetrating the world of appearances and arrive at the deeper level of happenings. This is not to say that the observed world is an illusion, just that it is an appearance which can be penetrated. Second, science deals with an economy of ideas; sometimes this gets distorted into reductionism (but not really!), but the overriding idea is to reduce myriad facts into a few theories derived from even fewer principles. The principles themselves may change with time but one principle that seems constant is that the world is an orderly understandable place.

I must hasten to add that science proceeds by a sequence of cycles. From simple observations one proceeds to controlled experiments based on some theoretical framework. The results of the experiments may strengthen that framework or suggest minor or major modifications in that framework. The newly refurbished theory is used to make new testable scientific predictions which in turn inspire new experiments. In these efforts it is only the simple minded that would assert that the theory suggested is in anyway unique. A different perspective may give a new cognition, a new theory. It does not happen too often: we scientists communicate well with each other, and we

share our thoughts and make collective critical assessments, until a truly gifted person of independent vision gives a new perspective. But even in such cases it is hardly "revealed knowledge"; rather it is a system painstakingly built up systematically.

The Role of Mathematics

We are all prisoners of our own culture. We find it difficult to think along radically new paths. The very language is beset with thought habits, and model building and reasoning in science are restricted by the concepts of the times. The great liberation from their bondage came with the use of mathematics as a tool and as the language of science. Twentieth-century physical science is so fully in the language of mathematics that the discoveries and theories of science are difficult to describe in ordinary language. The serious person admiring science sees that science enlarges one's concept structure; and that conceptual models of great subtlety can be borrowed from the physical sciences.

The increasing number of scientists, the technological applications of science which often masquerade as science, the detachment of the abstract mathematical language from everyday speech, the great complexity of scientific theories and the many years of apprenticeship in the process of becoming a scientist have made science a profession. Contemplation and reflection, philosophic inquiry and artistic inspiration—these have been de-emphasized and even derided. Philosophy is suspect: we do science, not reflect on it!

In many ways science has taken the place of religion in human affairs. It is a high calling, requires learning, discipline and dedication, is respectable; and scientists like clerics of a bygone era are assured of a reasonable comfortable living. And like the clergy of an organized religion, good scientists do not speculate, deviate from the norm, or rock the boat, but get along within the community. The community of scientists as a whole make changes in the collective wisdom but no visionaries are encouraged. This provides for stability and orderly progress. If the majority of scientists feel that the universe is without design or purpose, so be it: It is only a Freeman Dyson

who dares to enter a different view, a design for the universe in his book *Disturbing the Universe* in contrast to Jacque Monod's *Chance and Necessity*, Steven Weinberg's *First Three Minutes*, or E.O. Wilson's *Sociobiology*.

Science and Spirituality: Symbiosis or Predation?

Contemporary twentieth-century science is rich with conceptual gems: creation and destruction (of particles and excitations), symmetries, spontaneous symmetry breaking, non-commutation and consequent Heisenberg principle of uncertainties, Fourier transforms and holograms, hidden symmetrics, black holes, big bang cosmologies, and so on. At the same time there is a philosophic poverty. The spiritual yearning, the search for meaning and the hankering for magic have made many people turn to esoteric philosophies and religions as counterpoints to a scientific world view and a technological civilization.

Is Science a Spiritual Path?

Does science have a spiritual dimension? The answers are personal. Most scientists see no spiritual dimension. Nor do they feel a personal need for a spiritual path of any kind; they believe that it shows hard-nosed realism to have the courage to deny any such need. Some of them genuinely feel so; others feel that these disturbing questions are for the retirement years; and the majority go along since it is better to march with the crowd. There are a small group of people who do believe that a spiritual path is both desirable and necessary; and that science is an aid in this search.

How could science aid a spiritual search? First, science inculcates the work habit of disciplined observation and careful analysis. What is outward-directed to the extent it can be inward-directed becomes a spiritual discipline. Second, science produces more conceptual models in terms of which one's experience can be systematized and comprehended. We must recognize that this use of science is different from the use of scientific metaphors in exposition of spiritual doctrines.

Cognition and assessment of patterns, correlations, and mechanisms is different for different people. One person may feel

that the romance of the celestial objects is tarnished by astrophysics and space exploration; yet another may feel his wonder increase the more he knows of their true nature. Knowing how scattering in the atmosphere induces the color of the setting sun or knowing how twilight or the rainbow come to be does not make them any less enchanting. Being enchanted by a sunset or recognizing the magical quality of twilight depends on the nature of the person, not his knowledge of physical science.

Science and the spiritual search share many characteristics: both are experiential, both involve unchartered domains, both involve personal discipline and dedication; and finally both are creative and joyous.

There are many who say that science has made spiritual search unnecessary. They find that the old ways are misleading or irrelevant; and that science provides the sustenance of the spirit. One can but admire such intellectual austerity. But there are others who are not sure: they are not even sure which brand of science is most akin to religion; they then listen to the people who say that contemporary science has rediscovered/resurrected/vindicated esoteric ancient science. Apart from the precarious validity of an ancient doctrine which depends on today's science, one is also struck by the fact that no clues to the future development of science are forthcoming from these quarters. Sober reflection would suggest that it is the scientific path that is an aid to the spiritual path, not scientific facts or theories.

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