

focuses attention on the nature of physical objects in the quantum domain. He makes the point that in quantum physics, physical objects can no longer be viewed as individuals, rather they must be seen as 'non-individuals'. Paul Teller in his article introduces the term 'haecceity' to mark the idea that an object is distinct from all others in some manner that transcends all properties in any usual sense of the word 'property'. He then analyses the central question of the distinctness and identity of quantum entities in terms of haecceities. Finally, Maria Luisa Dalla Chiara, Roberto Giuntini and Decio Krause have tried to understand 'nonindividual' quantum objects in a logical framework by introducing the idea of 'quasisets' for describing collections of objects having cardinality but no ordinality, i.e. objects which cannot be studied within the realm of classical logic. They compare two different approaches to the notion of a quasiset.

I am not a specialist in philosophy and I cannot competently judge the articles written by philosophers. However, I would like to respond as a physicist and nonexpert to these articles. My overall impression of the book is positive. I feel that it is useful to have such a book in a physics research library. Researchers directly dealing with foundational issues of quantum mechanics will certainly benefit from reading this book. The relation between physics and philosophy has always been a troubled one. Many physicists are impatient with philosophical debates and it has happened in the past (as in the case of Boltzmann) that philosophy has been detrimental to physicists (if not to physics). But, there are also situations (as with John Bell) that philosophical arguments provide the impetus to formulate foundational problems in physics in a precise and testable manner. In general, it is perhaps good for physicists to widen their horizons by reading this book.

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**Ecology Today.** B. Gopal, P. S. Pathak and K. G. Saxena (eds). International Scientific Publications, 50-B, Pocket C, Sidhartha Extension, New Delhi 110 014. 1998. 472 pp. Price: US \$90.

When this reviewer was a student of B Sc Hons. School in Botany in 1945 at the Panjab University, Lahore (now in Pakistan), contrary to other subjects, ecology was taught by a professor from a local private college. At the time of final examination, out of the six papers and three practicals, the share of ecology was hardly one or, at the most, two questions. One could easily omit studying ecology. No good student, who wanted to ensure a first class, ever took research in ecology for MSc Hons. School. Anyone who ventured to do that, invariably got a third division in MSc Hons. School, which otherwise was a rarity. One could assign many reasons for this. The basic fact is that ecology was a down-the-line subject and was treated as a 'frill'. There were no good teachers. The subject was drab, uninteresting and did not evoke curiosity, and thus was not treated as a 'respectable' discipline. Two words were often repeated: *autecology* and *synecology*. To this day, this reviewer is not clear as to what these words mean in exact terms. It looks like these words in the current parlance mean population ecology/genecology, and community/ecosystem ecology, respectively. In short, there is no doubt that in the mid-1940s this subject was much maligned and accordingly no good student ventured to study this branch of science. This was the state of ecology at the Punjab University (Lahore) which I feel was also true of India as a whole.

On the contrary, today ecology is a respectable science with which our long-range ecological security is irrecoverably intertwined. We have to address the ecological crises facing our planet and humankind, because the future of all biota including human beings and that of the planet as a whole is intertwined with it. If the human race does not heed the warning bells, the short-sighted rich individuals and nations will become 'richer' and will eat into the vitals of humanity's future well-being. The human race as a whole is now becoming increasingly cognizant of the

dangers of such a short-term outlook. Therefore, it is not surprising that ecology today is an interdisciplinary science and with it is tied the well-being and the health of the whole biosphere of which humans are an integral part. Among other things, the subject has an interface with not only all sciences, particularly biological ones, but also economics, sociology, ethics and morality; and its frontiers are ever-widening.

Against this background, the publication of the book *Ecology Today* is indeed most welcome. It is essentially a collection of essays on different facets of this subject. Ecology inherently operates in a two-way road: local to global and vice versa, and each road is multi-lane. It is, however, true that ecology has regrettably also become a buzzword.

During the last 50 years or so, the subject of ecology has seen many vicissitudes. At one time it was a descriptive science involving distributional patterns of biota *vis-à-vis* edaphic and other factors, but today it is an all-pervading science with which the future of the human race is irrecoverably tied. Regrettably, today all shades of people have joined the 'band wagon' so that anyone who has no vocation has become an ecologist and/or environmentalist. Furthermore, today ecology has assumed a very wide meaning and has developed cross-links with a variety of subjects. It has a major contribution in making sustainable development a reality. A large number of compound words have been coined by prefixing the word *eco-* (short form of ecology) before these; we also now read about Political Ecology. The underlying idea is to make all tasks ecologically benign: we now have *eco-economics* and *eco-technology* (*sensu* M. S. Swaminathan), the underlying idea is to make economy and technology ecologically acceptable. Despite these changes, the subject of ecology is still in a flux and the final picture has yet to emerge.

The book opens with a thought-provoking paper by Francisco diCastri, entitled 'Ecology in Global Economy'. The two subjects, as indicated above, are interconnected, interrelated and interdependent. These have to be closely interlinked so as to make sustainable development a reality. Other essays have discussed specific issues ranging from atmosphere, hydrosphere,

biosphere and even, what we may call technosphere (technology, economy and connected matters). The specific ecological issues discussed in the volume include landscapes and their characterization using satellite data; ecosystem management using GIS and remote sensing; land-use dynamics based on systems approach; fertility of soils; rehabilitation of degraded lands; efficient use of nutrients; soil decomposer and mangrove systems and their nutrient recycling; chemical ecology and use of stable isotopes in ecological studies; biodiversity and developmental issues; protected areas management and size of populations in relation to conservation without genetic drift; fragile ecosystem and impact of water in desert systems; ecological management based on systems approach; statistical ecology; debate on global change; and finally, the human dimension dealing with the doings of the most self-centered, self-conceited and wicked species of all, the human being.

This indeed is a broad sweep. All in all the book paints on a very wide canvas. However, confusion is being created by making ecology and environment synonymous. This is not true. Ecology constitutes the core of environment, and ecologists have to realize that today's world is driven by economic forces. Therefore, the very core constitutes ecological assets and human ingenuity. These enable to convert ecological assets into products of use by human beings, which in turn leads to economic development. But sustainable development does not mean *status quo*. It implies constant change, upgrading and updating skills through innovation and diversification. This would also include updating economic, political, and social aspects.

The debate on patterns of development has been continuously updated since 1970s. It started as integrated or balanced development, ecological or eco-development, endogenous (autocentered), i.e. growing from within, sustainable (durable) development, viable human development, etc. The underlying idea is a sense of participation, equity and social justice, solidarity and foresight, which are not possible to measure in real operational terms.

Sustainable development, by its very definition is development that has to be

inherently linear and continuous under all circumstances including after escalating population. It implies constant updating and upgrading, so that it is not affected by change in environment (using the word in its widest sense). It also implies that we view future generations as a reflection of the present one. Future is inherently unknown, and cannot be predicted with precision. There is an inherent contradiction in this because we try to interpret sustainable development based on the present projections. No one can foretell with precise accuracy the needs and aspirations of the future generations, say in 2050 AD and thereafter. In other words, the basic point is that in future technological, social and economic innovations have to be constantly upgraded. This cannot be foretold in precise terms. History has shown that there has been constant innovation and upgradation of technological skills to meet increasingly more needs of the human race. One cannot hazard a precise guess about the long-term future. Equally important is the nexus between growing population and declining resources, changing perceptions and development of new technological skills. There is a race between these elements. Under the circumstances, there then creeps in the problem of the carrying capacity of a given system, about which we know next to nothing.

Some trends emerge on account of increasing human numbers and the declining resources. This results in lesser and lesser dependence on local resources. For instance, when human beings evolved and entered in a hunter-gatherer phase, it is guessed that all in all they depended on several thousand species. That was a period of trial and error. But today for their food needs they depend only on 30 species of plants and animals more so only on 7 species. This being so even when population of humans has increased tremendously. Thus innovation in ideas and skills leads to dependence of our large human numbers on increasingly smaller number of species which more often than not are not necessarily local. Another dimension of the problem is the shifting of environmental degradation away from where the resources are actually used. This is the result of a situation where resources are raised at one

place and need is in an altogether different place. Thus, local resources of the former tend to be conserved. In this process, sustainability in one place can be achieved by causing unsustainability in a different place. A glaring instance of this is industrial countries using products from developing countries who employ dirty technologies and cause considerable pollution problems for themselves. Furthermore, overall sustainability has to be complemented and supplemented by sustainability *on a holistic basis*, including economic and sociological aspects.

Often a basic question remains unanswered: where does economy spring from? In human sense, it springs from ecological assets (atmosphere, lithosphere, hydrosphere and biosphere) combined with technological ingenuity of the human mind. In nature, there is also economy, which springs from interaction between ecological assets, and nature's needs. Nature is very 'selfish' and inherently opportunistic, yet it is a conservationist system, more often than not it combines long-term flexibility with immediate fitness. It does this through mutation, recombination and a 'ruthless' process of natural selection. The unfit get eliminated. Normally, nature does not encourage inefficiency because more often than not there is tremendous competition.

Although the human race by using its intellect more often avoids facing natural selection and a degree of competition, it faces artificial selection. *Homo sapiens*, as a species, must remember that the wheels of nature grind rather slowly, and even imperceptibly, but these grind surely. Therefore, it is in the best interest of human beings to respect nature and natural laws, therein lies their long-term future and their ultimate salvation.

The foremost message of the book is that ecology is a science with very wide dimensions: these range from strictly local to global with a two-way traffic. More recently, ecology has also begun to ramify into the area of space. Obviously, it is a very pertinent and a relevant science on which depend the future of all biota including that of the human race. It is a multidisciplinary science. Therefore, we need to involve ourselves very deeply in this branch of science, and need to pay adequate attention to

our future for our own sake. Gone is the time when ecology was a frill or a fringe activity. Today, our understanding shows that the future of the human race can be ensured only by practising good and sound ecology.

This reviewer agrees with diCatri that sustainability is not a static concept. Implicit in this is regular upgrading and updating of skills so as to enable innovative ideas. In a wider perspective, the 20th century, on the one hand, has been a century of discovery, but, on the other hand, it has been (with the rise of the human power) a century of progressive ecological destruction.

We need to halt this onslaught because earth is the only planet (in our solar system) which harbours life. It is also the only home of *Homo sapiens*. Therefore, this species has to become increasingly human.

All in all, the volume is indeed a rich source of information and gives us the length, breadth and depth of a whole range of issues that come under the purview of modern ecology. It is dedicated to P. S. Ramakrishnan who is the foremost student of the late R. Misra, a father figure in India's ecological circles. The reviewer is sure that this volume will be read and will be used as a

teaching material for ecological courses. He congratulates the editors for conceiving, planning, concretizing and then implementing the project. They have rendered yeoman service to ecology, which is the science of hope for the future of biosphere, of which human beings are an integral part.

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## Meetings/Symposium/Seminars

### **Training programme on Methods and Approaches in Plant Taxonomy: Orthodox vs New Systematics**

Date: 26 October – 7 November 1999  
Place: Lucknow

Principals of colleges/Heads of University Departments, Senior Professors, Directors of Botanical Institutes, Heads of Forest Departments are requested to nominate suitable candidates along with one page bio-data of the candidates for final selection. Participants should preferably be below the age of 45 and pursuing active role in systematic teaching/research.

Contact: Dr. R. R. Rao  
Course Co-ordinator  
National Botanical Research Institute  
Lucknow 226 001  
Fax: 0522-282849, 282881

### **Workshop on NDE Science & Technology for Quality Improvement**

Date: 22-23 October 1999  
Place: Bangalore

The main objectives of this workshop are: (i) to highlight the role of NDE science and technology; (ii) achieving quality improvement to enhance productivity of products and services and (iii) to discuss the various facets which need to be focussed to achieve 'global quality' and acceptability.

Contact: Dr. Baldev Raj  
Convener  
Workshop on NDE Science & Technology for Quality Improvement  
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E-mail: dmg@igcar.ernet.in

### **Indian Veterinary Congress**

Date: 19-20 November 1999  
Place: Izatnagar

The objective is to focus attention and to generate awareness about the role of veterinary profession. Also taking place are the VI Annual Conference of IAAVR and Satellite Seminar on Management & Production of Scientific Journals/Periodicals

Contact: Dr. Rishendra Verma  
Organizing Secretary, IVC  
Senior Scientist  
Division of Bacteriology & Mycology  
Indian Veterinary Research Institute  
Izatnagar 243 122

### **National Workshop on Catalysis: Forays into Non-Traditional Areas (Catworkshop 2000)**

Date: 7-8 January 2000  
Place: Hyderabad

The workshop is designed to provide a blend of keynote presentations from experts, invited talks from accomplished scientists and brief oral and poster presentations from young researchers.

Contact: Dr. M. Subrahmanyam  
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