Statphys – Calcutta III. Proceedings of the International Conference on Statistical Physics. S. S. Manna and B. K. Chakrabarti (eds). Elsevier North Holland, (Reprinted from *Physica A*, **270**, Nos. 1–2). 1999. 334 pp. Price not stated.

An edited volume comprising papers presented (and in some cases, not quite in the form presented!) at a conference is necessarily to be 'reviewed' somewhat differently from standard books. *Statphys – Calcutta III* is the hardcover version of the journal *Physica A*, (**270**, Nos. 1 and 2), so that all the articles contained in it have already gone through the process of peer review, and are, otherwise, standard papers. Ergo, the book is an excellent document of the state-of-the-art in January 1999, when Statphys Calcutta III – the conference – was held.

Within the country, Calcutta appears to have an unusual affinity for Statphys conferences. Indeed, all three conferences with this title have been held in the city, the latter two at the S. N. Bose (another connection with statistical physics!) Centre. All three have attracted a wide participation from within the country as well as a fair sprinkling of practitioners of the science from outside. The proceedings of the previous two conferences were also published in *Physica A*, as it happens, so from the point of view of continuity alone if nothing else, this volume is well worth having.

There is, however, much else to commend the book. For one thing, this volume also celebrates the career of Chanchal Kumar Majumdar, erstwhile director of the S. N. Bose National Centre for Basic Sciences. Majumdar's contributions to science and to science in India are described in a moving tribute, containing a brief biographical sketch and summary of his research contributions, written by Indrani Bose in a preface to the volume. Majumdar has (in the words of Walter Kohn) 'given so much for physics in India at great personal cost'. His very untimely demise in June this year further emphasizes the magnitude of this cost.

The conference itself was a lively meeting of about 100 participants, with about 40 talks and the same number of posters. Roughly half these contributions have made it to the conference proceedings, which appeared in journal form in 1999 itself (this is most certainly a tribute to the efficiency of the Convenors of the conference, the Editors of this special volume, S. S. Manna and B. K. Chakrabarti). The special themes of the conference were the currently hot topics of 'Fracture, Breakdown and Earthquakes', though a fair number of other topics also came in for extensive covering. These include SOC (self-organized criticality), granular materials, interfaces, and hydrodynamic flow, as well as BIP (biologically inspired physics).

The volume reflects this diversity. The articles by Benguigui, Chakrabarti, Roux, Vilotte, Stanley and their various coworkers, are on different aspects of fracture and breakdown. SOC is represented in articles by Dhar, Tadic and Bose, while granular materials are the focus of the papers of Manna, Hermann, Kumar and Puri. The article by Bose is on a model of evolution and can be classified as 'BIP', though this is really in a different category from biomembranes or DNA dynamics. Other articles in this field are by Hansen, Stanley, Sastry and Pradhan. There has been a lot of work in the past few years on turbulence, chaos and nonlinear phenomena, and contributions from Bhattacharjee, Pandit, Ananthakrishna and Sinha are representative of the work being done here. Similarly, interface growth and the study of disorder and ordering are represented here by the papers of Dasgupta, Mookerjee, Banerjee, Barma, Das, Rao and Bhattacharya. Finally, the properties of natural materials also figure, in studies of clay by Fossum, and sandstones by Biswal. (The cited names are those of the authors who presented the work at the meeting; several of the papers have additional co-authors.)

The articles are, by and large, discursive, and provide enough of an introduction to the different areas covered in the conference, though it should be mentioned that some of the articles do have the 'conference' feel: they are summaries of papers that appear elsewhere. That does not necessarily diminish the utility of such a volume, since as an entry to the literature, this provides an excellent source of references and pointers to current work.

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Perplexing Problems in Probability – Festschrift in Honor of Harry Kesten. Maury Bramson and Rick Durrett (eds). Birkhauser Verlag AG. 1999. 408 pp. Price: SFr 138/DM 158.

The book under review is a collection of articles in honour of Harry Kesten. Although a substantial portion of the 20 articles here is on percolation, which has been Kesten's interest since the beginning of the 80s, the collection of articles here is as varied as has been Harry Kesten's academic output in the last four decades. It is impossible for an individual to attempt a just review of a book like this with specialized research articles on a variety of topics on probability; as such, a short abstract of the articles is presented here.

The paper by Gordon Slade is a survey of recent results which show that, in high dimensions, integrated super-Brownian excursion arises as the scaling limit of both lattice trees and incipient infinite percolation cluster. The paper by Roberto Schonmann considers the site percolation model on the transitive, non-amenable graph $T_b \times Z$, where T_b is a homogeneous tree of degree $b + 1$. It is shown that for this model, parametrized by p, for b large, at $p = p_u = \inf\{p$: there is a unique infinite cluster a.s.$\}$ there are a.s. infinitely many infinite clusters.

Olle Häggström, Yuval Peres, and Roberto Schonmann consider i.i.d. bond percolation on quasi-transitive graphs. For this it is known that there are two critical parameters, p_c and p_u, such that for $p > p_c$ there exists an infinite open cluster w.p.1, and for $p_c < p < p_u$ the number of infinite clusters is infinite w.p.l. In this paper, it is shown that under canonical coupling simultaneous versions of these results hold. In addition, for $p_c < p < p_u$, each infinite cluster has uncountably many ends. Moreover, if the graph is also unimodular, then for all $p_c < p_1 < p_2 < p_u$, every infinite cluster at level p_2 has infinitely many infinite clusters at level p_1 w.p.1.

Geoffrey Grimmett discusses some well-known and lesser-known inequalities in percolation and random-cluster models. Applications of these inequalities are given in the study of entanglements and to obtain strict inequality between the bond and site critical parameter as well as strict inequalities for

critical points of disordered random-cluster models.

The paper by C. Douglas Howard and Charles M. Newman studies infinite geodesics in models of Euclidean first-passage percolation on R^d. It is shown that for any dimension d, almost surely, every semi infinite geodesic has an asymptotic direction and every direction has at least one geodesic staring from each Poisson particle.

Janko Gravener and David Griffeath describe in their paper a general theory of reverse shapes and apply it to first-passage percolation and related growth models. Yu Zhang considers the standard first-passage percolation model on the integer lattice Z^d. Let $c_{0,n}$ be the first-passage time from the origin to the boundary of the box $[-n, n]^d$, where the edges have passage times arising from an i.i.d. family of random variables with distribution F. It is shown that for $d = 2$, there are two curves F_a and G_b, with $F_a(0) = G_b(0) = p_c$ such that $\lim_{n\to\infty} Ec_{0,n}$ exists whenever $F(0) = p_c$ and $F \geq G_b$. It is also shown that the integrated super-Brownian excursion measure is the restriction of its closed support of a Hausdorff measure. Thomas M. Liggett in his paper obtains precise asymptotics on the critical value and on the extinction time as $n \to \infty$ for a branching random walk on the ball of radius n in a homogeneous tree.

The paper by Lawrence F. Gray obtains the continuous time analogue of Toom's theorem on the stability of discrete systems under one-sided random perturbations. Claudia Neuhausers paper sets up a model of an ecosystem based on interacting particle systems and, in that framework reviews some of the mathematical results related to the study of the importance of space on the outcome of competitive interaction in simple plant competition models. S. R. S. Varadhan considers the space time rescaling of a system consisting of a large number of particles interacting with each other and moving randomly in R^d or Z^d. A large deviation principle for the empirical process viewed as a random measure on the path space is obtained when there is a diffusive or parabolic relation between the space and time scales. The paper by Ana Meda and Peter Ney studies an irreducible Markov chain $X_1, X_2 \ldots$ taking values in a state space S. For $u : S^2 \to R^d$, let $U_n = \Sigma_{i=1}^{n} u(X_i, X_{i+1})$; then conditioned on $\{U_n \in nC\}$, for some open convex subset C of R^d, it is shown that under certain conditions on $\{X_n\}$, it converges to a Markov chain.

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Mutational and Morphological Analysis – Tools for Shape Evolution and Morphogenesis. Jean-Pierre Aubin. Birkhauser Verlag AG, P.O. Box 133, CH-4010, Basel, Switzerland. 1998. 472 pp. Price: SFr 148/DM 178.

Many problems in diverse areas such as biology, economics, engineering, numerical analysis, physics and population dynamics involve the analysis, evolution, optimization and control of shapes and images. Due to the familiarity that mathematicians have with the analysis of functions and mappings, one often associates a suitable function with a set (or a subset) and analyses the same. To apply classical differential calculus, we require, therefore, the sets to be smooth. However, shapes and images are basically sets, and, most often, are not smooth. Thus we are led to set-valued analysis and to the construction of a differential calculus of mappings on a metric space whose elements are sets. This is the aim of mutational analysis.

Various approaches to set-valued analysis have been tried in the past. Viability theory deals with evolution equations, the solutions $t \mapsto x(t)$ of which are viable in *tubes* $t \mapsto K(t)$, i.e. $K(t)$ is a subset and it is required that for all $t \geq 0$,

$$x(t) \in K(t).$$

These tubes are first assumed to be given and the characterization of the viability condition led to the introduction of a class of derivatives of set-valued mappings, called *graphical derivatives*. However, if the evolution of the set $K(t)$ is itself governed by a kind of differential equation (called a *morphological equation*), then graphical derivatives are no longer sufficient to define the velocities of the tube, needed to design the morphological equation governing the evolution of subsets.

Shape optimization is concerned with problems of structural mechanics and optimal control of distributed systems. Many such problems can be formulated as the minimization of functionals over a class of subsets under some geometrical constraints. To study such problems, the concept of *shape derivatives* was introduced. This contains the seeds of the notion of mutations of a map.

The itinerary suggested in the book under review to deal with set-valued analysis – as against classical analysis – is to first study the properties of *power spaces* (i.e. families of subsets) and of set-valued or set-defined maps. The investigation of the properties of power spaces began at the same time as set theory at the beginning of the twentieth century. Painlevé (1902) introduced the notion of upper and lower limits of families of sets (now known as Kuratowski limits) and Pompeiu (1907) introduced a metric (distance) on families of non-empty compact subsets of a metric space (now known as the Hausdorff metric). However, set-valued analysis was neglected for nearly half a century and functional analysis gained importance.

The aim of mutational analysis is to provide new tools for set-valued analysis which complement the existing ones from classical analysis. As already mentioned, it aims to construct a differential calculus for set-valued and/or set-defined maps between power spaces of an arbitrary metric space. Special emphasis is given to the power space of nonempty compact subsets of a metric space. At the heart of the matter lie the notions of a mutation (generalizing the notion of a derivative) and of a morphological equation (a kind of differential inclusion).

We define the derivative of a function $f : V \to W$, where V and W are normed vector spaces, at a point $x \in V$, as a continuous linear map $f'(x)$ from V to W such that for all $v \in V$,

$$\| f(x + hv) - f(x) - hf'(x)v \| = o(|h|),$$

i.e. the image under f of the translation $x + hv$ of x in the direction v and the translation of $f(x)$ in the direction $f'(x)v$ should be 'close' for small values of h. Thus, the key to this definition lies in the notion of the translation of a vector, which, in turn, depends on the linear,

i.e. algebraic, structure of the vector space.

The notion of linearity is not indispensible for defining a differential calculus, although it greatly simplifies the definition of the maps and their study. It suffices to replace the notion of a 'translation' by that of a *transition* – if E is a metric space, we consider a space of transitions, i.e. mappings $(h, x) \in \mathbb{R} \times E \mapsto q \quad (h, x) \in E$, which satisfy a certain number of axioms. These play the role of $x + hv$. For instance, in a vector space, transitions could be defined using the solution trajectories, starting at x, of nonlinear ordinary differential equations. The value of the solution at time h would be $q(h, x)$.

A metric space with a space of transitions is called a *mutational space*. Given two mutational spaces E and F, and a single valued map $f : E \to F$, we say that a transition (on F) $t \in \overset{\circ}{f}(x)(q)$ is a *mutation* of f at x in the direction of the transition q if the transition $t\,(h, f(x))$ of $f(x)$ and the image $f(q(h, x))$ of the transition of x are 'close', i.e.

$$\lim_{h \to 0_+} \frac{d(f(q(h, x)), t(h, f(x)))}{h} = 0.$$

This simple structure allows one to adapt, in the framework of mutational spaces, a large number of important results of differential calculus and analogues of differential equations called *mutational equations*. This idea can easily be extended to cover set-defined and/or set-valued maps between power spaces. In particular, one considers various mutational structures on the space $\mathcal{K}(X)$ of non-empty com pact subsets of a finite-dimensional vector space X called a *morphological space*.

In the recent decades, various parallel approaches (mathematical morphology, shape optimization, graphical derivatives and mutations) have been developed. There is a deep unity of basic mathematical concepts and tools buried in these competing, yet complementary concepts. Mutational and morphological analysis offers a structure that embraces and integrates the underlying framework of these approaches and reveals that their apparent differences stem from the differences in the sources of motivation.

The monograph under review provides a fairly self-contained mathematical treatment of this subject. It is divided into four parts.

The first part is devoted to mutational analysis providing the abstract tools for studying set evolution. Most of the standard results on differential equations are adapted to the case of mutational equations.

The second part deals with morphological and set-valued analysis. The third part presents geometrical morphology and algebraic morphology. The latter connects algebraic techniques characterizing mathematical morphology with general morphological concepts arising in set evolution.

The last part is an appendix that provides a summary of the statements of basic theorems on differential inclusions used in the book.

Though the motivations come from diverse sources of real life problems, the book is written in a very rigorous mathematical style and will thus be accessible to those with a taste for, and training in, abstract and formal mathematical exposition. To ease the way, each chapter is provided with an outline that serves to orient the reader by providing a summary of the principal concepts introduced and the principal results proved in it. The book contains a fairly exhaustive bibliography.

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Flora of The District Garhwal North West Himalaya (with Ethnobotanical Notes). R. D. Gaur. TransMedia, Bhandari Bag, Srinagar (Garhwal) 246 174, India. 1999. 811 pp. Price: Rs 1600/US$ 100.

The mighty Himalayan range has lured pilgrims, practitioners of Ayurveda, geographers, mountaineers and botanists from all parts of India and the world. The Indian Himalayan Region (IHR) covers an area of 5,91,000 km^2 and extends over 2800 km in length and 220 to 330 km in width, with an altitudinal range of 300 to 8000 m asl. It is represented by 21 forest types and provides an enormous diversity of habitats, enabling the occurrence of a wide diversity of microbes, plants and animals. The mountain dwellers have depended on the resource of the region for subsistence for millennia. The increasing exploitation of Himalaya for industry, defence, agriculture, construction of roads and dams, over-collection of economic plants, grazing and development of townships has created severe environmental problems. The foremost among these has been the loss of biodiversity and valuable top soil caused by deforestation, mining, landslides and tourism. The acute shortage of water, feed for livestock, firewood for cooking and unavailability of minor timber for implements have caused intense hardships for the Himalayan people.

What has been already recorded through the preparation of Himalayan floras and faunas is impressive. The understanding of the strategies for survival of organisms under inclement climatic conditions has added a great deal to our biological knowledge. What is still not known is enormous, as the Himalayan region is vast and formidable to explore. It is in this context that the book by R. D. Gaur comes as an excellent contribution to our knowledge of the floristic wealth of north-west Himalaya.

District Garhwal has a wide range of habitats from Teraibhabar tracts at the foot of the Siwaliks to Dudhatoli (3114 m asl) in the north-eastern parts and includes flortistic elements of the Himalayan, Indo-Malyasian and Indo-Japanese elements. 57.89% of the district is covered by forests. Rajaji National Park and Corbett National Park are located in the study area. There have been earlier botanical explorations in the north-west Himalaya. What makes Gaur's flora unique? Most floras are written by taxonomists for other taxonomists (whose numbers are regrettably dwindling as their work is highly undervalued), drawing heavily on herbarium collections. While retaining the rigour expected of a professional taxonomist, Gaur's flora meets the needs of environmental managers, conservationists, wildlife biologists, agricultural scientists, foresters, anthropologists, planners, sociologists and above all common people.

The information provided in the flora has come from painstaking work done over the last 24 years by the author and his students, involving extensive field

studies, collections, notes on local names (vernacular, Sanskrit, Hindi, English) habit, habitat, plant size, colour of the flowers, phenology, pollen characters, general availability, ecology, phytogeography, etc. The author has recorded the traditional ethnobotanical knowledge of the Garhwalis spread over 3580 small and medium-sized villages.

The introduction gives a concise account of the geographic features, climate and inhabitants, including people and wildlife. The vegetation types of Garhwal have been classified on the basis of altitudinal zonation. The common standard abbreviations used in the text and of authors' names have been listed. A glossary of palynological terms is provided (although it is not clear from which sources these are taken). The identification of the plants has been confirmed and nomenclatural changes introduced. All the specimens collected have been deposited at the Herbarium, HNB Garhwal University, Srinagar (GUH), Garhwal.

Artificial keys have been provided for the identification of the species described. Although macroscopic features such as habit and floral parts are easily discernible, presence or absence of cambium and features of pollen require a thorough botanical background.

A statistical synopsis of the flora indicates that it contains 2150 species belonging to 1032 genera and 189 families of seed plants. Of these, gymnosperms are represented only by 10 species (8 genera and 4 families). The dominant families of flowering plants of Garhwal district are Leguminosae (228 spp.), Poaceae (193 spp.), Asteraceae (146 spp.), Lamiaceae (71 spp.), Cyperaceae (62 spp.), Orchidaceae (53 spp.), Scrophulariaceae (50 spp.), Rosaceae, (45 spp.), Euphobiaceae (43 spp.) and Rubiaceae (43 spp.).

Besides wild plants, cultigens and aliens (including weeds) have been included in the flora. Of special value to a user are the concise notes on ethnobotanical uses, valuable to practitioners of traditional systems of medicine and social forestry programmes. The study area includes 211 threatened taxa, of which 46 are endangered and the remaining rare. It is not clear whether this information is based on the *Red Data Books* issued by the Botanical Survey of India or quantitative data collected by the author, using revised IUCN criteria. The reviewer has a few points which need attention by the author. For example, *Cynodon dactylon* is an important pasture and lawn grass, but also occurs in cultivated fields all over India. It has been listed in this flora as a weed of the rainy season as well as of winter and spring. It is difficult to define a weed although the term is loosely applied to a wild plant growing where it is not wanted. The generally accepted functional definition of a weed is a plant which seriously interferes in one or another activity of humans. In many Indian scientific publications spinach (*Spinacea oleracea*) has been used as synonymous with palak. Many experts think that what we consume as palak is actually *Beta vulgaris* var. *cicla* Linn. The cultivated beets fall into two groups (i) the cicla group, including leafy vegetables and (ii) the crassa group, including those grown for roots (garden beet, sugar beet, etc.). This needs verification. Also *Melia azadirach* should read *M. azedarach*.

This monumental work could have been elevated to the rank of a classic had the publishers availed the services of a critical copy editor and a competent proof reader. There are several mistakes in Latin names of plants and a few avoidable flaws in the language. The scientific names of birds listed could have been checked by referring to a standard work like the *Book of Indian Birds* by Salim Ali (Twelfth revised and enlarged centenary edition, 1996).

The cover jacket is attractive. Unfortunately, there are no colour illustrations or line drawings inside. The book is priced at Rs 1600. Only libraries and overseas botanists can afford to buy it. Gaur was probably conscious that the cost would have gone up further if he had included some pictures from his marvellous collection. In the considered opinion of the reviewer, such works which provide the resource base for knowledge and rural development should be subsidised by a central funding agency. The author must have spent a good amount of his own money, besides time and energy in preparing the manuscript for the press. In the process he has earned something more enduring – fame. V. Puri the eminent nonagenarian botanist states in the foreward to this volume that four decades ago, Gaur, his student at Meerut College, was a simple, hard-working and intensely ambitious young man who belonged to Garhwal. After the publication of this voluminous flora that embodies hard and sustained work, Garhwal belongs to him. This is indeed a tribute to be treasured.

This admirable work produced through utter dedication by Gaur contains a wealth of information. It is recommended to any individual or organization interested in the biodiversity of Himalaya and in the sustained utilization of plant resources.

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Mountain Biodiversity, Land Use Dynamics, and Traditional Ecological Knowledge. P. S. Ramakrishnan *et al*. Oxford and IBH Publishing Co Pvt Ltd, 66 Janpath, New Delhi, India. 2000. 353 pp. Price not stated.

Among the challenges brought in by the 3rd millennium AD, integrating land use dynamics and people's traditional ecological knowledge for the sustainable management of biodiversity can be considered as the most urgent. Such an urgency is felt much more in a country like India whose human population has already crossed the one billion mark – it is also likely that within the next 5 to 10 years India's cattle population will reach similar magnitude! While many countries, which are reeling under terrific biotic pressure lack the expertise, manpower and financial resources for managing their biological resources in a sustainable manner, India certainly has the capacity to address these issues. In fact, the country has taken a lead in this regard and attempted to outline management strategies based on a number of case studies.

One major initiative that has directly addressed the issue of sustainable management of biodiversity by integrating land use dynamics and traditional ecological

knowledge is that of the Man and Biosphere Programme and UNESCO with the support of IHDP/DIVERSITAS and the Mac Arthur Foundation. The book under review is an attempt to synthesize the results/lessons learnt from this initiative.

The book deals with three case studies undertaken by different collaborating institutions covering the Western Ghats and the Himalayas – two of the globally recognized biodiversity hot-spots. The specific landscapes chosen for the studies include two protected areas, viz. Chinnar Wildlife Sanctuary in Kerala (Western Ghats) and the peripheral areas of the Nanda Devi Biosphere Reserve (Himalayas) and another intensely human-altered landscape in the Western Ghats, viz. Kodagu.

Kodagu is known for its biodiversity wealth. Nevertheless, intensive cultivation of coffee has been the single largest threat to the landscape's biodiversity. Coffee cultivation in Kodagu is an age-old practice. What is of concern is the current shift from cultivating shade-tolerant varieties to light-tolerant ones, and this is likely to have a greater bearing on the natural forests and biodiversity. Land tenure systems, since the Colonial period, which permit the planters to remove trees from their plantations, have contributed rather significantly to the loss of biodiversity in the landscape. Diversified agroforestry, including home gardening has been suggested as a future direction that the landscape development can adopt.

The situation in Chinnar is slightly different. It is largely to do with hill-tribes living within the sanctuary. The study has shown that the tribals are dependent on 140 species of plants for their livelihood. People living adjacent to the sanctuary have currently resorted to extracting lemon grass oil. While the cultivation of lemon grass has led to productive use of degraded lands, the extraction process itself is heavily dependent on locally available firewood. This has placed a lot of pressure on the forests in the landscape. One of the recommendations of the study is the adoption of agroforestry practices which enable better regeneration of locally available trees, so that the biomass requirement can be met sustainably.

In the buffer zone of the Nanda Devi Biosphere Reserve, the pastoral communities have heavily relied on their livestock. Grazing pressure has been severe due to the smaller extent of pasture made available since the Reserve was declared. While these pastoral communities have survived largely on a wool-based economy, they have also cultivated for their subsistence more than 30 species of food crops in a system of traditional agroforestry. Among other things, the study has suggested the improvement of livelihood of these communities through value-addition to agroforestry by encouraging the cultivation of medicinal plants.

In general, the outcome of the three studies points to the fact that for sustainable management of a landscape where human pressure is rather intense, diversified agroforestry could be one of the solutions. Such an inference can be heartening to planners and administrators of biodiversity.

However on the whole, unfortunately, the book lacks clarity since the rambling style of writing does not lead the reader to the crux of the issue. It carries with it a sixteen-page supplement titled, 'Executive Summary'. The scope of this summary is however not clear, since the same finds a place in the book itself. Further, the summary fails to synthesize the outputs of the three case studies.

The overall presentation of the case studies, which one would expect to be in-depth and analytical, is patchy, having adopted a list-mode (especially the Chinnar study) and sandwiched between two long essays written by the senior editor based on his vast past experience. Further, the three case studies are not balanced. While the case study of Kodagu is rather detailed, those of Nanda Devi and Chinnar have failed to adopt any logical flow in approach or presentation. The case study of Chinnar, in fact, seems to hang in time, without accounting for any historical events or processes that have contributed to the current state.

Also, some of the recommendations made for the sustainable development of these landscapes seem contradictory. For example, while it has been reported that potato growing has been singly responsible for loss of agrobiodiversity in Nanda Devi, value addition to potato by training the local communities in state-of-the-art post-harvest techniques is proposed. Similarly, in Chinnar it is recommended that trench digging be adopted as a forestry practice to encourage, amongst others, the proliferation of *Prosopis juliflora*! In all three case studies, there is little said about the relevance of traditional ecological knowledge.

As a general remark, it is quite disappointing that the book is too full of spelling and syntax errors, including many wrong common and scientific names of species (e.g. Brown Deer *Ursus arctos*, a Himalayan animal, p. 19). Also, certain statements have been repeated verbatim throughout the book as that on the last paragraphs of pages 17 and 18, and then on page 177 – clearly results of careless editing. While P. S. Ramakrishnan, the senior editor, needs to be lauded for launching and co-ordinating this mega-initiative, a humble request from all users would be 'please let us have carefully edited publications, whatever they are'!

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Press Tools – Design and Construction. Prakash H. Joshi. Wheeler Publishing, A Division of A.H. Wheeler & Co, Ltd, 411, Surya Kiran, 19, Kasturbha Gandhi Marg, New Delhi 110 001. 2000. Price: Rs 460.

Press tools like xerox machines produce multiple *copies* of originals onto thin sheets. Unlike copying planar images, press tools impart three-dimensional features onto thin sheets of metal, plastic, paper and even leather, rubber and cloth. Press tools are designed to pierce, bend, cut and shear thin sheets to form cups, cans, bowls, cowls, mugs, spoons, grills; doors, bumpers and hoods for cars; coins, medals, escutcheons, credit cards; mil-

lions of other implements, utensils and appliances; and, the *mightiest* of all – books and newspapers. The sheer volume of press trade in terms of people, land, money and materials is just not possible to estimate today. Just to give an example, Americans need more than a hundred billion cans for food and beverage every year[1]. Similar astronomical figures also apply to millions of other domestic, automotive and electronic products made using press tools. Thus, press tools generate as much wealth as waste; and, therefore, recycling is a key part of press trade. Supplementing *recycling*, designers are also focusing more and more on handling thinner and thinner sheetfeed to produce smaller, lighter, cheaper and more compact products.

Handling petal-thin sheets calls for sophisticated and sensitive press tools to protect the products. Designing such tools demands a thorough appreciation of engineering science on the one hand and a competent selection of motors and controls on the other. In the context of press tools design, knowledge of engineering mechanics pertaining to plasticity, fracture and contact phenomena is essential. Regarding motors and controls, a basic appreciation of digital data acquisition to facilitate computer control of machine tools is desirable.

Traditional press toolmakers have arrived at this critical juncture not fully trained to blend their legendary artistic skills with the precision and control of contemporary science and technology. Lamentably, as a result, many small-time trades and crafts are gradually vanishing from the scene and their place taken over by big-time global industries. It is somewhat ironical that press tools have played a key role in globalization through free press and free trade.

All said and done the number of books written by practitioners is steadily dwindling leading to an alarming dearth of *authentic* information about engineering practice. In this respect, the book under review is a welcome whiff of fresh air bringing out the aura and aroma of press trade. The author presents a panoramic view of the subject including materials, processes, manufacturing, planning, selection and existing standards along with an introduction to computer-aided design of press tools. The book covers a wide variety of operations performed by press tools beginning with cutting, bending, forming and drawing as four separate chapters (B–E). There is one chapter (F) on miscellaneous operations such as bulging, embossing, coining, etc.

The publishers of this book use a different tradition for indexing chapters (A, B, . . ., N); and, pages, figures, tables and examples are marked as A1, A2, etc. This style of indexing the contents is confusing and makes it difficult for the readers to access information quickly. It is perhaps appropriate to borrow a line from an essay on tradition by T. S. Eliot: 'In English writing we seldom speak of tradition, though we occasionally apply its name in deploring its absence'. Hopefully, the publishers will restore tradition in the next edition of this book. The author may also find it of some value to compare the *ratio* of tonnage to weight of different presses listed in the chapter on selection of presses. This tonnage to weight ratio serves as a useful design *index* to assess the design efficiency of commercially available presses. The author may also consider adding information about a few foreign machines with regard to their design index. It is also worth considering adding more material on forming – limit diagrams and processing maps to emphasize the interplay of mechanics and materials science in press working[2–4].

In summary, this book highlights the various dimensions in the design and construction of a variety of press tools from a practical viewpoint. I recommend this book for all *real* engineers either at school or at work, and for all managers of industries using press tools.

1. Hackworth, M. R. and Henshaw, J. M., *Eng. Frac. Mech.*, 2000, **65**, 525–539.
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