ings presented, and the editors' reviews and generalizations, provide a wealth of useful material and raise significant questions that will undoubtedly stimulate future inquiry and cross-national comparisons on the "fundamental, although elusive, reality" (p. 1) of the informal economy.

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Paleoichnology

Dinosaur Tracks and Traces. DAVID D. GILLETTE and MARTIN G. LOCKLEY, Eds. Cambridge University Press, New York, 1989. xviii, 454 pp., illus. $54.50. Based on a symposium, Albuquerque, NM, May 1986.

The field of vertebrate paleoichnology is attempting to come of age, and the maturation process has been expressed largely in the form of meetings devoted to new discoveries. This volume, the result of the First International Symposium on Dinosaur Tracks and Traces, is a collection of 50 papers of variable quality, devoted to establishing vertebrate paleoichnology as a field in its own right.

The obvious strength of this volume is in providing a single reference source for vertebrate paleoichnology. A number of papers provide useful overviews of the occurrences of footprints in various parts of the world. Stimulating papers relating functional morphology to gait are presented (for example, by Padian and Olsen). Several other papers provide good descriptive accounts of new track localities or describe old trackways for the first time (for example, Farlow *et al.*). The editors emphasize that the study of footprints is now ready to move from these more traditional topics and make new contributions to our understanding of paleoecology, biostratigraphy, and the behavior of extinct organisms. Reality, however, may argue otherwise.

The consensus is that footprints cannot be assigned to a taxonomic level finer than family. Despite this repeated admission, the editors in the introduction to the section on biostratigraphy (p. 199) insist that vertebrate tracks hold much promise in this field. Since most dinosaur families are long-lived, recognition of tracks at a family level can, at best, provide only a large-scale resolution to stratigraphic questions. For some questions, resolution no more precise than, for example, assignment to the Upper Cretaceous may be sufficient. However, the prospect that a tool limited to such large-scale resolution can make a significant contribution to biostratigraphic problems seems unlikely.

A few papers include paleoecological conclusions. For example, in explaining the stratigraphic distribution of track types in the Triassic, Demathieu remarks that "the competition between the two groups of reptiles must have been relatively great." Competition is a phenomenon that most ecologists find difficult to detect at any taxonomic level. It seems highly unlikely that footprints, identifiable at best to the family level, can be useful in addressing the complex issue of competition, and such a discussion should be dismissed.

Another questionable point is raised by the discussion of prints attributed to swimming sauropods (for example, by Ishigaki). There exist three distinctly different types of trackways of sauropods that are considered to indicate swimming (see Lockley and Conrad's paper for references). Rather than consider these tracks as representing three different styles of swimming, Lockley and Conrad interpret them as underprints, a feature created in the subsurface beneath the original tracks. This interpretation may be correct, but the authors continue by stating that attribution of the prints to swimming sauropods will contribute to reviving the hypothesis that sauropods were aquatic (p. 124). Humans are certainly not aquatic, yet they can leave marks on lake or stream bottoms when they are in the water. The fact that sauropods may have likewise spent time in the water, swimming or otherwise, does not imply a preferred aquatic mode of life. A useful paleoecological point in the same chapter concerns the distribution of tracks through various depositional environments, drawing attention particularly to the numerous occurrences of tracks within dune facies. The potential of arid dune environments as a source of paleontological information is beginning to be recognized.

Several papers deal descriptively with eggshells. I am not clear why eggs are considered to be only "traces" of dinosaurs. Eggs with embryos certainly cannot be treated as such. If eggs are considered to be traces because they are composed of calcium carbonate rather than apatite as are bones, why should we not consider all of invertebrate paleontology the study of trace fossils? The reader is left with the impression that this book is intended as a bandwagon and the section dealing with eggshells is included to insure the field's popularity.

Overall the layout of the book is good, and there are an acceptably low number of typographical errors, unlisted citations, and poorly reproduced graphics. It may come as a surprise that so many people were able to contribute to a volume on this subject. The editors, however, should have exercised a heavier hand in selecting papers or at least worked to raise all of them to professional standards. For example, the following blatant sarcasm (Agnew *et al.*) is included: "Field preservation, with the requirements of at least fencing the site and possibly roofing it as well may just be too expensive for busy research scientists to go seeking funds. Who can blame them when it is such a time-consuming activity to protect a site?" Such a tirade is entirely irrelevant.

I consider this a useful book, although I do not share the optimism of the editors that vertebrate paleoichnology is ready to stand on its own. Recognition of the abundance of vertebrate tracks is a different issue from their practical utility for detailed studies. I encourage those dealing with trace fossils and dinosaurs to become familiar with this volume, for it represents the state of the science of fossil footprint studies. I think the field has a long road ahead in determining its potentials and limitations. Perhaps the most appropriate remark within the book concerning this field is, "The journey of a thousand miles begins with a single step" (Lao Tse, p. 3). That is precisely how this volume should be viewed.

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Quantum Electrodynamics

Photons and Atoms. Introduction to Quantum Electrodynamics. CLAUDE COHEN-TANNOUDJI, JACQUES DUPONT-ROC, and GILBERT GRYNBERG. Wiley-Interscience, New York, 1989. xx, 468 pp. $59.95. Translated from the French edition (Paris, 1987).

Recent years have witnessed a renaissance of interest in atomic physics and its interplay with quantum optics. Laser, maser, and synchrotron sources have revolutionized the study of interactions between matter and radiation. More recently, the invention and perfection of traps for single atoms—honored by the Nobel prize a few months ago—have opened the door to stunning experiments on individual atoms interacting with light. Previously, only large ensembles of atoms could be dealt with, and a number of quantum mechanical effects were thus hidden. The new developments have stimulated a vast amount of research.

This book, which is a translation of a French work, presents the theoretical foundations for the description of atoms and radiation and their interplay. The underlying theory, quantum electrodynamics, is well covered by textbooks, but these text-