The Actions and Applications of Radiations

The Science of Ionizing Radiation: Modes of Application. Compiled and edited by Lewis E. Etter. Thomas, Springfield, Ill., 1965. xvi + 788 pp. Illus. $26.50.

Almost everyone should find something of interest in *The Science of Ionizing Radiation*. It treats a wide range of topics, illustrative of the interdisciplinary nature of the actions and applications of radiations. In some respects this book is the successor to *The Science of Radiology*, which was published in 1933. Its scope is much broader, however, because in the intervening years the ionizing radiations have found application in virtually all areas of science and technology. Thirty-five scientists have contributed to this volume, which consists of 29 chapters grouped into the following sections: History, Equipment, Physics, Chemistry, Biology, Radiology, Industrial Applications, Crystallography, Archeology, Anthropology, Graphic Arts, and Agriculture. The most extensive coverage is given to radiographic and radiotherapeutic applications in man.

The various reviews of the basic and applied aspects of the ionizing radiations appear to be written primarily for the nonspecialist. Although the expert may, therefore, find something to be desired in the treatment of his own subject, the book as a whole represents a useful addition to the literature. There are numerous charts and diagrams and selected references for each chapter. The chapters describing the discovery of x-rays and radium are as entertaining as they are informative, with excellent documentation of highlights in the lives of Roentgen and the Curies. Graduate students, in particular, should find this volume a valuable compendium of the radiological sciences. Those who work with radiations for one or another purpose will, no doubt, also find it to be a convenient source book.

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Tools for Early Man: Pin Hole Cave, Derbyshire

Bone, Tooth, and Horn Tools of Palaeolithic Man. An account of the osteodontokeratic discoveries in Pin Hole Cave, Derbyshire. James W. Kitching. Manchester University Press, Manchester, England; Humanities Press, New York, 1964. xiv + 55 pp. Illus. $4.50.

Several decades ago A. L. Armstrong, a surveyor by trade and an ardent amateur archeologist, carried out investigations in several caves about the Creswell Crags in Derbyshire. This little book discusses the mammalian skeletal remains recovered during those excavations and accumulated during two periods of human occupation—the Mousterian (by Neandertal peoples) and, later, the terminal Paleolithic or Creswellian (by modern *sapiens* peoples). Although records of depth and distance from an entrance point were kept, it is unfortunate that these are apparently inadequate to permit treatment by distinct levels, and that the faunal assemblage can be treated here only as a whole.

Aside from some amphibians and a dozen small mammal species, largely rodents which doubtless represented the prey of owls, and a few birds, fish, and bats which did not, the bulk of the remains are of larger mammals, especially reindeer ($\geqq$ 200 individuals), some horse ($\geqq$ 25 individuals), woolly rhino ($\geqq$ 20 individuals), bison ($\geqq$ 9 individuals), and more rarely giant deer ($\geqq$ 3 individuals) and woolly mammoth ($\geqq$ 3 individuals), with, in the later occupation only, wild boar ($\geqq$ 2 individuals). The remains of hare are especially numerous. There are a few remains of small carnivores (badger, stoat, and polecat), felids (cave lion below and wild cat above) and brown bear ($\leqq$ 6 individuals), and more numerous remains of wolf ($\geqq$ 10 individuals), fox ($\geqq$ 20 individuals), and especially cave hyena ($\geqq$ 25 individuals). Of some 11,500 skeletal parts more than 35 percent are fragmentary flakes from ungulate limbs; nearly 50 percent of the total represent various remains of five ungulates and four large carnivores. About 40 percent of the total comprise head parts—isolated teeth, antlers, mandibles, and cranial fragments, in decreasing frequency.

More than a third of the fragmentary remains (flakes and bits of antler) evince signs of erosion from gastric acids and traces of gnawing by hyenas. The author argues that hyena remains were deliberately brought into the small cave by early man. On the contrary, the evidence would perhaps more strongly favor occupation and some measure of bone accumulation by hyenas. This might also very well account for the notable absence of many skeletal parts, especially long bones and also parts of the axial skeleton, of the larger herbivore species. Because the successive fillings of the cave were not fully mapped, and were also in part at least excavated in arbitrary thick spits, it is of course impossible to reconstruct, even approximately, occurrences by levels, and the nature of periodic visitations, whether by man or hyenas.

Kitching, who has had a major role in R. A. Dart's work in South Africa on the accumulation and deliberate fracture of bone, tooth, and horn (osteodontokeratic) to produce varied implements at an australopithecine site, maintains the same view in the interpretation of some of the Pin Hole Cave faunal remains. There can be little question that some bone breakage and fracture was by man, just as some was by hyenas. However, probably not a few students of the problem will be unable to follow the author's recognition of an elaborate suite of nonlithic artifacts and his designation of their likely usages. In my opinion this problem is still very much in need of further comparative and experimental investigation.

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The Quest for Numbers

The Phanerozoic Time-Scale: A Symposium Dedicated to Professor Arthur Holmes. W. B. Harland, A. G. Smith, and B. Wilcock, Eds. Geological Society of London, London, 1964. viii + 458 pp. Illus. $14.50.

If you tend to stumble on "post-Precambrian," as most people do, you may prefer to take a deep breath and say "Phanerozoic." It's a little arcane, but it means the same thing.

The "aeon of clearly discernible life" is divided into the Paleozoic, Mesozoic, and Cenozoic eras, each of which has several periods. They, in turn, have divisions and subdivisions, of which the definitions and redefini-