some contributors turn their attention to quite other fields—to the domain of human culture built on a biological basis but not reducible to it (Theodosius Dobzhansky, Dorothy Lee, Ludwig von Bertalanffy), or to the characteristics of the esthetic experience (Gyorgy Kepes), or to the Zen experience and the disciplines of which it is the fruit, Daisetz Suzuki).

The volume concludes with a challenging summary and criticism of the papers of the conference by Walter Weisskopf and the replies to this analysis by a number of the contributors.

The papers which make up *New Knowledge in Human Values* present a wide divergence of views held by persons from a wide range of fields. The papers are short, trenchant, and well written. As Bronowski has discerned, there is a deep, underlying difference of attitude on the part of the contributors concerning how much the quest for a value orientation appropriate to modern man can be aided by empirical science. This is indeed a complex problem which must be worked through. It is a merit of this book to have exhibited the problem and laid before the reader some considerations relevant to the issue.

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An Introduction to Probability Theory and Its Application. vol. 1. William Feller. Wiley, New York; Chapman and Hall, London, ed. 2, 1957. xv + 461 pp. Illus. $10.75.

The first edition of this book was very successful, and this second edition should be even more so. Most books which attempt to develop probability theory rigorously are readable from the mathematician's standpoint but assume too much familiarity with recondite branches of mathematics to attract most physicists, engineers, or others needing probability and statistics as tools. They also tend to present abstract discussions largely devoid of applications.

The present book is rigorous but contains a wealth of illustrative material and examples relative to physics, genetics, contagious disease, card games, traffic and queuing problems, industrial quality control, chain reactions, engineering, and statistics. Most of the chapters include numerous problems, ranging from simple exercises to applications and extensions of the text.

This volume is restricted to discrete sample spaces. This is a severe limitation but one which permits the basic theory to be discussed without appeal to measure theory and allows advanced topics such as random walks and Markov processes to be included. A second volume, to include continuous sample spaces, general theory of random variables and their distributions, limit theorems, diffusion theory, and other topics, was promised in the first edition. It is hoped that it will be forthcoming soon.

The author suggests chapters 1 ("The sample space"), 5 ("Conditional probability. Stochastic independence"), 6 ("The binomial and the Poisson distributions"), and 9 ("Random variables; expectation") as a "beginner's course," with browsing in chapter 2 ("Elements of combinatorial analysis") to help develop technique. Chapter 3 ("Fluctuations in coin tossing and random walks") is entirely new and demonstrates some amazing results totally at variance with results expected on the basis of naive intuition. An example is that the probability of heads (or tails) being "in the lead," for a long series of tosses, for about 97.6 percent of the time is 0.20; for 99.4 percent of the time, 0.10. The fraction of the time "ahead" or "behind" is much closer to zero or 1 than to the "expected" value 0.5. With 10,000 tosses, with probability 0.5, there will be fewer than 68 returns to zero, and of these only half will be changes of lead. One wonders how many reasonable experimental results have been rejected as subject to systematic error or how many erroneous conclusions have been drawn because the experimenter did not know of the arc sine law.

Chapter 11 ("Integral valued variables. Generating functions") may be tackled after chapter 9 in an introductory course and is used in chapters 13 ("Recurrent events") and 12 ("Compound distributions. Branching processes"). Limit theorems and fluctuation theory are discussed in chapters 3, 8, and 10; Markov chains in 15 and 16; random walks in 3 and 14; stochastic processes (including "birth" and "death" processes, waiting lines and servicing problems, the Chapman-Kolmogoroff equations, and other topics) in 17 ("The simplest time-dependent stochastic problems"). Many chapters are on an advanced level; many are independent of the others; all are well written.

Some typographical errors were noted, in which exponents or subscripts were missing—for example, page 164 (1.1) where the exponent is omitted (this should be $-\frac{1}{2}x^2$ rather than $-\frac{1}{2}x$); the equation on page 164 (1.10) where y has not been squared; the equation on page 271 (2.5), where λ_2 has lost its subscript; and the equation on page 83 (6.8), where s in the exponent has also not been squared. (Is it chance that 2 has been left out in each case?)

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Systema Helminthum. vol. 1, parts 1 and 2. *The Digenetic Trematodes of Vertebrates.* Satyu Yamaguti. Interscience, New York, 1958. 1575 pp. Illus. $90.

This monumental work on the systematics of digenetic trematodes is the culmination of Satyu Yamaguti's many years of diligent study of actual specimens, and it is based on his exhaustive review of the pertinent, voluminous literature. On the basis that our knowledge of life-histories of Digenea is inadequate to permit the erection of a system based on natural relationships, the author has based his system on the "whole picture of morphological characteristics." Hence, except for orders, he has not dealt with taxa higher than families. He has presented keys and diagnoses for orders to genera and subgenera. In some families he has introduced tribes which are, for example, substantially equivalent to the sub-subfamilies used by Dubois for the strigeatoids. For each genus the type species is stated, followed usually by a list of species, and accompanied at times by notes on life-histories. The author has erected a few new families, many new subfamilies, some new tribes, and a few new genera.

Keys and diagnoses occupy part 1 (979 pages). Part 2 contains a very useful systematic review of the Digenea of vertebrates and their host relationships (36 pages); an extensive bibliography (216 pages); illustrations (109 plates with 1302 figures) done by the collotype process; and an index (131 pages).

The diagnoses have been especially prepared by the author and are based on first-hand information or on the literature. I believe that they are adequate. The keys are, of course, artificial. I have not tested them on specimens for workability. The figures have been reduced considerably, some of them to the point that a reading glass is required for a careful examination of details. With few exceptions there is a figure to illustrate a species of each genus. If possible, the type species is illustrated.

In the plates one error of mislabeling occurs. Figure 1069, plate 89, shows *Postharmostomum laruei* McIntosh but is labeled *P. noveboracense* McIntosh. I noted a few errors in the text—for example, *Riberoia ondatrae* (Price, 1931) Price, 1942, is assigned to the new genus *Pseudopsilostoma* (page 904) on the assumption that the species is not congeneric with *Riberoia* Travassos 1939, but on page 622 this species is referred to the new genus *Pseudopsilotrema* which is both a *nomen nudum* and a synonym of *Pseudopsilostoma.* I have personally examined Price's type and paratypes, including two series of frontal sections, and can vouch for the presence of the esophageal diverticula which are

characteristic of the genus *Riberoia* Travassos, 1939. Comparison of Price's specimens with the description of *Riberoia ondatrae* by Beaver (1939) convinced me that Price and Beaver were dealing with the same species. *Cercaria thomasi McMullen,* 1938, then becomes a synonym of *Riberoia ondatrae* (Price, 1931) Price, 1942. Whether the genus *Riberoia* is correctly assigned to the family Cathaemasiidae Fuhrmann, 1928, cannot be judged with certainty because of the lack of information on the character of the excretory system of *Riberoia.* The diagnosis of the family Cathaemasiidae states that the excretory system is "Y"-shaped, without numerous branches. However, my recent examination of the excretory system of specimens of *Cathaemasia reticulata* (Wright 1879) shows that both stem and forks of the "Y" have numerous lateral branches.

Yamaguti has followed Dollfus (1939) in the partition of the family Troglotrematidae Braun, 1914. However, I believe that the two subfamilies Renicolinae and Collyriclinae do not belong in this family but should have the full family status that has been accorded them by others. The life-history of *Collyriclum* Kossack, 1911, is not known. This genus has small eggs, indicating that it does not belong with the Troglotrematidae. Its position under the skin of the host is not a character of sufficient importance to justify inclusion of the genus in the Troglotrematidae. Possibly it should be assigned family status in the Plagiorchioidea. The genus *Renicola* Cohn 1904 has a very unusual type of cercaria with a large tail with finfolds and also a peculiar excretory system so unlike that of any other known cercarial type as to suggest that the genus should be assigned to a separate family.

On page 929 *Sellacotyle mustelae* Wallace, 1932, is misnamed *Troglotrema mustelae, family Troglotrematidae.* However, *S. mustelae* appears on page 890 under the new subfamily Sellacotylinae which is properly placed, I believe, in the family Nanophyetidae Dollfus, 1939.

Whether Paragonimidae Dollfus, 1939, should stand as an independent family must await the results of further study. The cercaria of *Paragonimus* is microcercous and very similar to the cercariae of *Nanophyetes* and *Sellacotyle,* family Nanophyetidae. Moreover, the excretory systems of the respective cercariae are similar. It is true that in the adults of *Paragonimus* the excretory bladder is cylindrical, whereas it is saccular in the Nanophyetidae. However, in *Paragonimus* the bladder of the metacercaria is saccular, undergoing modification to cylindrical after the parasite enters the final host.

A number of typographical errors have been noted. These are incidental to bookmaking.

It must be recognized that the placing of any given taxa in a taxonomic system is a matter of judgment, and that the weights assigned to a set of characters may differ with the taxonomist. While there can be no full agreement about certain details of the system set forth by Yamaguti, he has, in my opinion, provided students of digenetic trematodes, both beginners and experts, with a very valuable tool. During the early phases of the identification process the use of this volume, because of its completeness, will obviate an extensive search through a widely scattered literature; but for the identification of species it will still be necessary to consult the original sources. There can be no doubt that this volume will greatly further the study of the Digenea.

The foreword is by E. W. Price, formerly head of helminthological investigations, Animal Disease and Parasite Research Branch, U.S. Agricultural Research Service.

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The Transvaal Ape-Man—Bearing Cave Deposits. Transvaal Museum Memoir No. 11. C. K. Brain. Transvaal Museum, Pretoria, Union of South Africa, 1958. 131 pp.

The discovery of abundant remains of australopithecines ("ape-men") in southern Africa has truly revolutionized many earlier views of human evolution. Hitherto only the first known site of Taung(s) in eastern Bechuanaland has received detailed geological study (by F. E. Peabody). In this publication C. K. Brain presents the first detailed analysis of the situation, mode of origin, stratigraphic structure, and cave-deposit sedimentation of the four other australopithecine sites, all in the Transvaal.

The study is in two main parts. The first section—essentially methodological—presents observations on dolomite caves, their origin by solution or subsidence, and the origin and nature of the cave fillings, both before development of a substantial surface connection (fillings such as stalactites, stalagmites, travertines, residual cave earths) and after development of such a connection (cemented breccias, and so on). The establishment of a condition of equilibrium with the surface permits an assessment of outside conditions through an analysis of the composition of the fossiliferous, cemented, surface-derived soils (breccias). A comparative base line is provided by present-day dolomite soils from regions of differing rainfall in southern Africa. The methods of breccia analysis, all of which have climatic implications, are based on (i) angularity of siliceous sand grains, (ii) percentage of carbonate cement, (iii) quantity of weathered dolomite fragments, (iv) breccia color, (v) grading of sediments, and (vi) ratio of chert to quartz grains.

The second part of the study constitutes a careful application of these methods of analysis to the four sites of Sterkfontein, Swartkrans and Kromdraai (near Krugersdorp) and the Makapan Limeworks (near Potgietersrust), in southern and central Transvaal. The combined result of these investigations indicates that the Sterkfontein accumulations covered an extensive dry phase (30 to 22 inches of rainfall); the Limeworks accumulation covered the end of a long, more intense dry phase; the Swartkrans accumulation covered a brief dry phase followed by somewhat damper conditions; and the Kromdraai accumulation covered a considerably wetter phase (about 40 inches of rainfall). The temporal relation of the sites, listed above in the order of their respective ages, is determined by the associated mammalian faunas. Brain regards the three older sites as all falling within a major dry interpluvial stage (with at least three separate peaks) and the youngest site (Kromdraai) as falling in a succeeding wetter pluvial stage. These climatic phases are tentatively tied to the Kageran/Kamasian interpluvial and the early Kamasian pluvial succession of the late Lower and early Middle Pleistocene. Since this succession is not yet clearly established in eastern Africa, where tectonics and faulting played an important role in creating and draining lakes, I feel that any such correlations must be regarded as provisional.

This meticulous and thorough study is a major contribution not only toward a clearer understanding of the australopithecine sites but also toward a more accurate conception of Pleistocene climates of a part of sub-Saharan Africa. The methods employed should have a broad usefulness both in Pleistocene geological and in prehistoric archeological studies.

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An Introduction to the Theory of Integration. Adriaan C. Zaanen. North-Holland, Amsterdam; Interscience, New York, 1958. ix + 254 pp. $7.25.

Since the publication in 1937 of Saks' now classic *Theory of Integration,* new trends have brought about a great deal of change. The set theoretical approach in measure and integration, already present in Saks' book, has become an essential part of the theory. The linear ap-