technological machinery required for the investigation of the properties of these highly versatile subcellular structures.

In essence, this book will impress the reader with the importance of a thorough understanding of catabolic processes mediated by lysosomes in the interpretation of numerous cellular physiological and pathological events.

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Neoplasia

The Cancer Problem. A Critical Analysis and Modern Synthesis. ARMIN C. BRAUN. Columbia University Press, New York, 1969. x, 214 pp., illus. $8.50.

Research in cancer for many decades has been guided and even dominated to a considerable degree by the notion that cancer is an expression of altered genetic composition of the precursor cell more or less resembling a somatic mutation. This concept has inevitably led many workers to the consideration that the neoplastic transformation is a series of irreversible changes all leading to an irrevocably altered cell. The factual basis for this generalization is indeed meager, being mainly the ubiquitous experience that the neoplastic expression is transmitted from cell to cell. Obviously, this judgment ignores another possibility—many biological expressions, such as those associated with differentiation of somatic cells, that are transmitted from the parent cell to the progeny as in the case of neoplastic cells may be the consequence of a modulation of a common genome rather than of an alteration in genomic information.

The present exposition of the cancer problem by an expert in plant pathology, especially plant neoplasia, is a clear and welcome challenge to the dogma. This small monograph gives a lucid description of some of the highlights of our present knowledge and concepts concerning the metabolic and molecular basis of cellular behavior in growth and differentiation and how such knowledge may well explain the essence of the neoplastic process. Although the author emphasizes plant systems, he by no means ignores animal systems, including the human. In fact, he makes every effort to show the basic similarities between plant and animal cells with respect to their response to carcinogenic hazards in their respective environments. As described by the author, the ways in which plant systems can be influenced by the various environments, including their ability to revert from obvious neoplastic behavior to normal, are impressive. Yet he stresses that, their greater manipulability notwithstanding, plant cells do show many of the features shown by animal cells during carcinogenesis.

Unfortunately, there are several weaknesses in the exposition. The treatment of carcinogenesis in animals is arbitrary and not very sophisticated. For example, the author repeatedly refers to the "two-stage" hypothesis, when there is no evidence for *two* stages, only for more than one. The omission of any serious consideration of different cell populations during carcinogenesis in several tissue systems is an obvious and regrettable flaw, and the author bases his discussion of chemical carcinogenesis on groups of chemicals for which we have the least information about possible mechanisms (for example, polycyclic aromatic hydrocarbons).

Despite these shortcomings, the book is highly recommended for any serious student of the cancer problem, especially the young but also the veteran investigator. The emphasis on the reversibility of cellular changes in neoplasia and on the need for a much more dynamic approach to understanding cancer is a welcome antidote to the rigid thinking that pervades too much of cancer research today. The continual attempt to relate biological behavior to chemical activities makes the book an especially useful one for the incoming cancer research worker with a strong chemical or biochemical background who would like to begin to appreciate conceptually the biology of neoplasia.

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Geochronological Method

Potassium-Argon Dating. Principles, Techniques and Applications to Geochronology. G. BRENT DALRYMPLE and MARVIN A. LANPHERE. Freeman, San Francisco, 1969. xiv, 258 pp., illus. $7.50.

Many recent books in geochronology are like the camel, which, according to some wag, is a horse put together by a committee; not so this book by Dalrymple and Lanphere. The book grew out of a pamphlet written in response to requests from a number of U.S. Geological Survey geologists who wanted a better understanding of potassium-argon dating. The authors attempted to preserve the simplicity of the original pamphlet while making the book more nearly complete and more useful. As they point out in their preface, the book is not intended to be a scholarly or comprehensive review of potassium-argon dating, but rather an introduction to the principles, techniques, and applications of the method. Nevertheless it succeeds in doing for potassium-argon dating what Willard Libby's book *Radiocarbon Dating* did for that radioactive clock; it provides a balanced and sufficiently comprehensive introduction to the subject for the nonspecialist user of the data. It also contains a substantial amount of practical information that will help earth scientists and anthropologists use potassium-argon dating results to better advantage.

Except for a few errors, the first three chapters present an excellent, simplified review of the physical principles underlying the potassium-argon dating method. However, as anyone can verify by going to the literature of nuclear physics, it simply is not true that "no detailed theories of nuclear structure and radioactivity can yet be developed" (p. 25). Also, the assertion that "in the earth's atmosphere the inert gases are about a thousand times less abundant than they are in the solar system" (p. 21) is a great underestimation; the least depleted of the inert gases, xenon, is over a millionfold less abundant in the earth's atmosphere relative to the solar system, and helium is depleted by a factor exceeding 10^{12}.

Chapter 4 presents a good, conventional description of the ideal potassium-argon clock. I prefer a more general approach, that is, to start with a non-ideal open-system model including an external argon pressure and derive the ideal model as a special case. Extraneous argon is thus explicitly included as a separate term and need not be introduced later, *ad hoc*, as an afterthought. The open-system model would also lead conveniently and without discontinuity to discussion of argon loss (treated in chapter 9 of this book). The net effect of introducing the open-system model is not unnecessary complication but rather simplification and increased continuity.

With the exception of the treatment