Book Reviews

Radiation Effects

Cancer in Atomic Bomb Survivors. ITSUZO SHIGEMATSU and ABRAHAM KAGAN, Eds. Japan Scientific Societies Press, Tokyo, and Plenum, New York, 1986. viii, 196 pp., illus. $55. GANN Monograph on Cancer Research no. 32.

Survivors of the atomic bombings of Hiroshima and Nagasaki in 1945 provide the major source for estimates of irradiation-induced harm to humans, and this slim volume reviews the carcinogenic effects of radiation in the Japanese. The broad basic facts are now well established: The bombings caused acute leukemia with peak incidence five to seven years after irradiation, and solid tumors only after a 15- to 20-year latency with continued increasing incidence 40 years later. Hiroo Kato, epidemiologist with the Radiation Effects Research Foundation (RERF; formerly Atomic Bomb Casualty Commission, ABCC), provides a chapter that summarizes the major findings and gives a total for excess mortality due to irradiation-induced leukemia and cancer. He estimates that from 1950 to 1978, 190 excess deaths from leukemia and 336 excess deaths from cancer occurred, for a total excess mortality of 526 persons among 283,000 survivors.

The 13 chapters in this book address the epidemiological and statistical methods used in studying this vast population, the bombs and their power and composition and emission of radioactive particles, and the epidemiology of specific cancers. In basic destructive power the bombs themselves were both in the range of 15- to 20-kilotons of TNT equivalent. However, the uranium bomb used on Hiroshima generated relatively more neutrons than gamma rays compared to the plutonium bomb Nagasaki received. Attempts to assign actual radiation doses to people at varying distances from the bomb epicenters have been stymied by our inadequate understanding of the physical properties of these two weapons. Another report by the physicists is in preparation, but I doubt that precise consensus on the physical aspects of the irradiation will be achieved. The issue is not simply pedantic, because almost all biological dose- or distance-related effects seem about twice as severe per unit of radiation in Hiroshima as in Nagasaki. Maruyama, in his chapter, reviews the bombs and the problem of dosimetry in a manner comprehensible to the non-physicist.

Concerning carcinogenesis, the RERF/ABCC group of scientists continue to provide support for a direct linear relationship between radiation dose and leukemia and cancer induction. Their data support some excess carcinogenesis when children are the targets, but otherwise the cancers occur in their usual age-related manner. Cancers of all tissue sites, except, curiously, rectum and uterus, have been increased in incidence in bomb survivors in a dose-related way. Kato's chapter has a useful illustration of the relative risks of cancer by dose, and leukemia, of course, leads with a 12-fold relative risk. Although acute lymphocytic leukemia was never detected and tissue lymphomas occur with only modest relative risk of 1.8, multiple myeloma is a B-cell disease that has emerged only after 30 years with a high relative risk of 6. Ichimaru and her colleagues present an interesting discussion of myeloma and also provide a solid review of the leukemia and lymphoma data.

The book, well written and cohesively and carefully edited, is a welcome summary of the current status of carcinogenesis among the people of Hiroshima and Nagasaki. The publication was solicited by the Japanese Cancer Association as part of the total international summing up, in August 1985, of the first 40 years of the atomic age. Somehow, the inhumanity of war, and of nuclear war in particular, hovers over this report. Made more sinister perhaps by the careful prose and guarded conclusions of the statisticians, this is nonetheless the horrifying account of the aftermath of humanity's first venture into nuclear war.

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Early Cognition

The Origins of Logic. One to Two Years. JONAS LANGER. Academic Press, Orlando, FL, 1986. xii, 415 pp. $75; paper, $36.95.

For a time, in the rush to elucidate the remarkable capabilities of newborns and young infants, the second year of life was all but forgotten by psychologists. Recently, however, there has been renewed research attention to the cognitive, social, and emotional transformations that occur during this period. Current studies show that in the second year children make major advances in understanding language and everyday routines, controlling their attention, solving problems, and discovering caregivers as both social partners and conveyers of rules. At the same time, however, less mature behaviors persist, and loss of control sometimes occurs. These mixed patterns of behavior virtually guarantee an unsteady transformation to higher levels of functioning.

In *The Origins of Logic: One to Two Years*, Jonas Langer asserts that the second year is a time of developing logicomathematical knowledge. Langer maintains that logic exists when young children show an awareness of part-whole relationships, reversibility of sets, and the quantitative equivalence of objects. This cognition is not initially based on a symbol system; logical mathematical operations come out of young children's interactions with their environment, and cognitions are constructive products of their own actions and observations. But here too, the transformation to logical thought is not simple; elements of primitive and more advanced forms of cognition coexist.

Langer draws from Piaget, who defined logicomathematical "experiments" as deductive reasoning discoveries made by children in the preoperational stage of thought. Piaget's classic illustration concerned a five-year-old who by chance found that arrangements of objects are independent of their sum. Piaget emphasized that such discoveries result from actions on objects. Langer also gives a prominent role to action, but he places the beginnings of logicomathematical cognition at about 15 months of age. Toddlers, he says, show evidence of composition of sets, decompositions, exchanges, classifications, and substitutions of objects. Langer records in great detail the object manipulations of these very young children as they group and regroup small sets of playthings, seemingly taking into account their forms and functions. According to Langer, these kinds of elementary logicomathematical actions will ultimately be linked to representational ideation.

Are these child acts genuine exemplars of logicomathematical thought? It depends upon one's definition of the construct. A long-held view is that logical thought must involve ideas, sequences of reasoning, proofs, and inferences. Many would argue that the mere grouping of objects and their subsequent displacements do not constitute logicomathematical thought even if children realize that actions are associated with particular principles.

However, Langer is not the first to suggest that very young children have sophisticated cognitive abilities. Other investigators indicate that basically nonverbal infants are able to define simple categories and discriminate small number groupings. These behaviors, some propose, bear a resemblance to those shown by more cognitively mature individuals. Accordingly, the term

used to label the mature cognitive activity is applied to infant behavior. However, the described resemblances may be more apparent than real. Can the processes involved in an infant's cognitive *awareness* of objects be similar to those used by an adolescent, for example, who is attempting to understand and to reason through set theory? Surely this level of thought goes beyond sensory and motor acts and involves constructing, manipulating, and evaluating ideas. By assuming a comparability with sensorimotor cognition, the complexity of mature thought is trivialized.

This issue aside, Langer's descriptions of children's interactions with objects are the most detailed ever reported. They are singular in demonstrating the extraordinary attention, precision, experimentation, and organization young children bring to their activities. Langer complements his descriptions with a multilevel developmental model drawn from structuralism, information processing, linguistics, and mathematics, interpreted with his own slant. He calls his model recursive: higher forms of cognition emerge only when earlier forms reach a certain state of development, then both continue to grow. The model is also multidirectional in that logicomathematical cognition occurs separately but interactively with the development of physical (causal) cognition.

Even if Langer's perspective of logicomathematical thought is accepted, two important questions remain: Has he demonstrated sound empirical evidence for his views? Does his model of development make theoretical sense? The answer to both is "not yet." Methodological problems are serious. Although Langer's descriptions are detailed, they are based on too few observations per subject and too few subjects per group. It is difficult to determine whether the actions described are rare occurrences or commonplace and whether they are representative of the groups as a whole. Further, Langer's cross-sectional design is inadequate for his developmental model, which requires longitudinal data. Clearly, a larger study that tests hypotheses longitudinally is necessary.

Potential readers of this book need to be aware that a challenge awaits them. Langer writes in a highly specialized language and ignores virtually all the precepts of Strunk and White. If readers can surmount this hurdle they will find that Langer's premises and observations are not only provocative but suggest other questions about early development: Is control of attention, for example, a precondition for control of objects? Are children's seemingly rule-bound understandings of objects linked to their social understandings and interactions? What facilitates the transformations of the second year, and what hinders them? Langer's ideas will surely stimulate discussion and controversy about the second year of life and the meaning of early thought. Thus, despite its shortcomings, this is a book to read.

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Phytogeography

Floristic Regions of the World. ARMEN TAKHTAJAN. University of California Press, Berkeley, 1986. xxii, 522 pp. $60. Translated from the Russian edition, with revisions by the author, by Theodore J. Crovello. Arthur Cronquist, translation editor.

This book, rewritten from the original Russian edition of 1978, is, I believe, the best published floristic division of the world into such chorionomic categories as kingdoms, regions, provinces, districts, and their various intermediate categories. Each floristic unit is described, at least briefly, with listings of the endemic or nearly endemic families, a generous sample of the endemic and subendemic genera, and those larger families and genera that are heavily represented in the region or lesser chorionomic unit. The degree of generic and specific endemism is regarded by the author as a significant factor in the definition of phytochoria.

The author introduces each region and lesser unit with a selection of references. He describes the area included in each unit with consideration of the variant ranges and boundaries of other phytogeographers. Also for each unit he discusses the richness or poverty of the flora, the principal plant formations, the characteristic, and often relict, taxa, and floristic relationships to adjacent provinces, including enclaves of other floras. A few useful outline maps of northern continents or large regions are scattered in the text to delineate visually the floristic provinces and subprovinces. More such maps, especially for the austral continents, should have been included. Double-page world maps delineating floristic regions of the world are attached to the front and back covers.

The treatment of the various floristic regions is somewhat uneven, for the author naturally gives more attention to those areas with which he is most familiar. It should be noted here that Takhtajan is widely traveled and conversant with the floras of many parts of the world. The editor, Arthur Cronquist, has expanded the descriptions of the floristic regions of temperate North America, giving special attention to the dominant plant communities and the probable history of the flora. For those parts of the world with which I am especially familiar, North and Middle America, Australasia, and Indomalesia, I found the floristic classification and descriptions quite accurate and reasonably adequate.

Probably there are no two phytogeographers who would agree completely with any given floristic classification of the world. Although this book has caused me to modify considerably my own chorionomic classification of the world's floras, I would prefer somewhat different boundaries and ranks for the Pacific and Antarctic phytochoria. I would, for example, prefer to treat the Neozeylandic Region, or most of it, in the Australian rather than the Holoantarctic Kingdom. Likewise I would include the Fernandezian and most of the Chile-Patagonian regions in the Neotropical rather than the Holoantarctic Kingdom. But such classifications are rather subjective, and boundaries have to be rather arbitrary.

The 44-page bibliography, organized as "general" and by kingdoms, is fairly adequate for most parts of the world. I would have included additional titles, especially some of my own papers, but I may be a mite prejudiced here.

An appendix of 52 pages will be considered by many taxonomists at least as important as the text itself, for it is the latest version of Takhtajan's phylogenetic classification of the extant families and higher categories of vascular plants, with indication of the number of genera and species and the geographical distribution of each family. There have been some realignments and considerable increase in recognized orders and families since the last publications of his system. As a somewhat more conservative phylogenist, I wish that the author had applied to his taxonomic classification the splendid principles he enunciated in the introduction for his floristic classification: "Chorionomic inflation threatens to make the floristic system very cumbersome, difficult to visualize, and unfit for use."

The long and invaluable index was prepared by Mabel Cronquist. The book is singularly free of typographical errors and is attractively bound and printed. Briefly, I consider this book to be indispensable for every biological library and for the bookshelf of every taxonomist, ecologist, and biogeographer. I shall certainly assign it as a reference text for my biogeography course this term.

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