Book Reviews

Developmental Abnormalities

Teratology of the Central Nervous System. Induced and Spontaneous Malformations of Laboratory, Agricultural, and Domestic Mammals. HAROLD KALTER. University of Chicago Press, Chicago, 1968. xvi + 481 pp., illus. $17.50.

Teratology means the science of the marvelous, the wondrous, the monstrous, and commonly connotes the study of abnormal anatomic development. To developmental biologists, however, wondrous anatomic malformations, aberrant metabolic pathways, and some monstrous behavior and other functions are only different manifestations of the phenomenon of development. In this broad view teratology of the nervous system might embrace all of abnormal developmental neurobiology. Considering the problems of scope that this presents, Kalter has elected to tell about gross anatomic malformations of the central nervous system in a variety of mammals, though not including man. What could justifiably have been an annotated bibliography has been enlivened and made readable by the author's comments about many of the huge number of experiments and observations that make up this field. The first part of the book considers environmental factors that initiate abnormalities generally, and the second describes malformations that arise spontaneously in particular groups, such as mice, cattle, or subhuman primates.

Some interesting things emerge. One is the imagination of experimental teratologists who think up ways to alter the young carried by pregnant mammals. These range from administering all sorts of drugs, hormones, dyes, anticancer agents, and deficient diets to freezing and then thawing the mother-to-be. Another is the frequency with which seemingly similar types of malformation occur again and again in different species when different injuries—and sometimes genes—are at work. Disorders of closure of the early spinal nervous system or the brain, for example, are surprisingly common occurrences when environmental agents act at appropriately early periods. I don't suggest resurrecting the old notion that any agent at a given time in embryonic life will induce the same anomaly, because different agents act through different mechanisms. That the outcomes are often similar is partly due to the nature of the abnormalities that Kalter has selected; being grossly recognizable they tend to be of the kind originating in earlier developmental stages. Some of the grossest deviations from normal form would be expected to occur when "the construction of the house was disturbed as the foundations were being laid."

In spite of the differences in causal mechanisms, there could be a benefit to man in studying intensively how the various disorders of closure—the so-called dysraphias—come about. Man and other mammals share a substantial fraction of their DNA segments, and they may have more normal and abnormal developmental mechanisms in common than we have thought. The commonest major congenital anomaly in man, according to C. O. Carter (1965), is the anencephaly–spina bifida cystica syndrome, that is, a complex of various failures of closure and malformation of the spinal nervous system and brain. In some populations the incidence of this syndrome approaches 8 in 1000 births, exceeding that of serious heart anomalies and mongolism. Recent neurosurgical techniques have greatly increased the survival of some of the children so incapacitated, creating a new aspect of the problem. Should the animal models help in understanding the disease and lessening its incidence, their value would be incalculable.

The state of the art of experimental teratology is still very much that of empirical exploration, but mechanisms are being studied. Though each aspect is of necessity treated briefly, Kalter's book will be valuable not only to those in the cognate neural sciences but to anyone planning experiments in abnormal development and to those who are charged with assessing the safety of drugs and other agents during human pregnancy.

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Space Facts and Figures

The McGraw-Hill Encyclopedia of Space. McGraw-Hill, New York, 1968. xii + 831 pp., illus. Through 31 Dec. 1968, $23.95; thereafter, $27.50.

Above and Beyond. The Encyclopedia of Aviation and Space Sciences. Wallace B. Black, publisher; Jean F. Blashfield, editor-in-chief; Raymond J. Johnson, editor. New Horizons, Chicago, 1968. 14 vols. xii + 2677 pp., illus. $79.95.

These works fill a need for a single-point, up-to-date reference in their field. Cutoff dates on content appear to be late 1967 for the *McGraw-Hill Encylopedia of Space*, and 1966–67 for *Above and Beyond*. The reviewer has leafed through both encyclopedias and read carefully and selectively comparable sections.

McGraw-Hill's one-volume work weighs 6¾ pounds and averages two or more black-and-white or color photographs or diagrams to each of its 817 pages. The quality of paper and color reproduction is excellent. About half the content is text, the remainder photos, tables, and diagrams. The list of contributors—25 U.S., 37 Soviet, 44 other European, and 1 Japanese—is most impressive. The articles are not signed, however, and all were "rewritten by an international board of distinguished journalists so that every word . . . is now understandable to the general reader." There is no indication that the rewritten articles were ever reviewed by the original authors. Coverage is excellent, and most of the photographs are dramatic and show careful selection.

The section on rocket history contains a number of minor errors, such as that the Bachem BA-349 was "in service" in World War II (it was not) and that Robert Goddard worked on missiles for the "American Navy" (he worked on JATO's). There are numerous strange spellings of names which suggest transliteration by a non-U.S. writer (Wan Pou for Wan Hu, G.U.I.R.D. for G.I.R.D.). Terms like "lamp oil" for kerosene, "petrol" for gasoline, and "fixed-aim" for fin-stabilized suggest that no American rocket historian reviewed galleys. The section dealing with rocket principles contains much convoluted writing, again indicating foreign translation. Under the heading of propellants there is the strange statement that "To provide a take-off acceleration of 4*g* a liquid-propellant rocket would require an enormous motor, which would constitute a technological absurdity." This is nonsense. Reference

to solid-propellant boosters as "accelerators" or "300-stage" is puzzling. Perhaps "zero stage" was misread by a typist.

Once one gets through this initial thicket, the text improves considerably, although one is still occasionally puzzled by a term. The sections dealing with Soviet flights seem authoritative, and there are many interesting and new color photographs. The tables of U.S. and Soviet manned space flights and the descriptions of lunar trajectories, nuclear propulsion, planetary research, and applications satellites are excellent. The sections on European programs and international cooperation are well done. The lack of credit lines for the photographs is disappointing; sources are simply listed in the back of the book. In summary, *The Encyclopedia of Space* emerges as a remarkably all-embracing work and a dandy family or V.I.P. Christmas gift.

Above and Beyond costs about three times as much and is about three times as long. The 14 volumes are in a large format with an average of 185 pages. Aviation and space flight are covered about equally. All articles are signed. Each volume contains hundreds of photographs, mostly in good color, with source credits. An index of 114 pages in volume 14 has been carefully prepared, together with a listing of contributors. Many prominent U.S. aerospace writers are noted. Cross-referencing appears to be very good.

Two aspects of note are the careful historical treatment (of World War I aircraft, Lindbergh, the Wright brothers, and the Zeppelin, for example) and the inclusion of several hundred biographies of significant flyers, engineers, and scientists, living and deceased. All astronauts and cosmonauts are included. Each biography is illustrated with a line drawing of the person.

My test search for particular subjects gave indication of good coverage with one notable exception—the U.S. Navy NC-4. I could find no mention of this historic craft, which in 1919 made the first transatlantic crossing by heavier-than-air craft. The Alcock and Brown and R-34 flights are mentioned, however. The article on Rockets and Rocketry is lengthy and well illustrated; there are some minor errors. The article on Rocket Propulsion contains a few strange statements, such as that "only very low specific impulses have been obtained to date with electric rocket motors," and a diagram of an electric rocket engine that is weird, but otherwise it covers the subject in a generally satisfactory fashion. Pilot training and private flying are treated substantially, as well as military aviation. Basic scientific subjects such as "electricity" and "atoms" receive individual treatment.

Each volume has a fine cloth binding with heavy protective coating. *Above and Beyond* should find wide acceptance in schools and libraries.

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Democratizing and Producing

The Human Organization. Its Management and Value. RENSIS LIKERT. McGraw-Hill, New York, 1967. xi + 258 pp., illus. $7.95.

Despite this book's apparently narrow focus on business firms, few works could be more relevant to many of the central problems of our times. It should have something of interest to say to Charles de Gaulle, Andrew Cordier, Pope Paul, "Danny the Red," and anyone else concerned with how to design an organization or society which is efficient and well coordinated as well as democratic and solidary.

The author, professor of psychology and sociology and director of the Institute for Social Research at the University of Michigan, seeks to describe and extol the "System 4" (or "Participative Group") approach to improving the management of human organizations. System 4 is characterized principally by participatory decision-making, close and supportive interactions, and extensive communication between and across all organizational levels. According to the studies Likert reviews, when coupled with competent management and high performance goals these factors promote greater motivation and loyalty as well as better products and higher profits than systems which would be characterized by lower scores on these core factors (such as System 1 or 2—"Exploitive Authoritative" and "Benevolent Authoritative"). The image of the System 4 approach that emerges is of a conglomerate of vertically and horizontally overlapping group linkages such that, for example, the superior in each group is a subordinate in one at the next hierarchical level. (Perhaps unfortunately, the organizational structure does not come full circle—the top levels are not then subordinates in the lowest levels.)

It is important to see Likert's work in the context of the development of organizational theory. Two major traditions can be identified: the classical sociological tradition (including the work of Marx, Weber, Michels, and the post-Weberians) and the "scientific management" tradition (including Taylorism, the human relations approach, and the group dynamicists). Essentially, while the classical tradition was working "down" from a concern with freedom and power at broad societal levels to the internal organizational structure, the managerial tradition, starting from a concern to enhance worker productivity, has worked its way "up" from material conditions and physiological levels, through individual feelings and attitudes and small-group situations, to aspects of organizational structure. Although Likert is one of the leading exponents of the group-dynamics tradition, his book may also be seen as part of this convergence: it is founded on a clear recognition of the importance of motivational forces and small-group interaction, but an effort is made to take into account the systemic nature of the enterprise and to articulate its formal and informal aspects.

I think the work should be taken as a tentative diagram. The evidence supporting many of the notions is rather slight or open to serious methodological criticisms (such as that direct, independent measures of organizational efficiency and effectiveness are lacking). Even if there were no problems of this kind, however, I would still have serious reservations. For one thing, the work tends to be atomistic, in that the focus remains largely on small-group interaction: the organization is treated primarily as an aggregate of small groups, and characteristics of the more emergent organizational levels are not developed. For another, the attention of these studies is largely centered on management: (i) Managers and lower-level supervisors provide almost all the information by which organizations are characterized; one wonders whether those supervised share these feelings and perceptions. (ii) It is never made sufficiently clear on what basis the workers participate in decision-making and what would happen if they became disagreeable. Little notice is taken of how a managerial monopoly of "facts" and "expertise" can affect such group decision-making. (iii) It is not clear what is open to discussion and participatory decision-making. "Goals" are referred to, but it is dubious that in actuality decisions concerning organizational goals (products to be produced