ative" (for expediency, I shall adopt the naturalistic convention about creativity). With the help of vivid passages from the writings of Einstein and some contemporary poets, the author argues that creative folks like doing what they are doing, and that when they begin to worry too much about fame and riches their work suffers. Hence "Intrinsic motivation is conducive to creativity, but extrinsic motivation is detrimental" (p. 15), a conclusion that informs the rest of the volume.

Though the idea that there is a link between intrinsic motivation and creativity is appealing, it is accepted too readily by the author. It is not clear, for example, to what extent intrinsic motivation is a necessary or a sufficient precondition of creativity. There are certainly many activities, like sports, in which intrinsic motivation is necessary, yet which are rarely creative. One might agree with the author that placing too much weight on extrinsic rewards will detract from creative performance, but this may not tell us anything specific about the presumptive creative performance. The examples in the book draw exclusively on testimonials by artists and scientists steeped in a post-Romantic culture. If one reads accounts of the lives of the great Renaissance geniuses one is impressed by their constant and insistent carping about how many gold pieces they got or failed to get from their patrons and about the artistic pecking order of which they were a part. Though this almost obsessive concern with extrinsic rewards might have hampered their work, the work is nonetheless worthy of being designated creative.

The central one hundred pages of Amabile's volume are devoted to reporting the effects of various manipulations on "creative" performance in a variety of social-psychological experiments. For example, when children think that their work will be evaluated by adults, they make collages or write poems that are judged to be less creative by experts than the collages or poems they produce when they do not expect to be evaluated. Similarly, children rewarded for their work produce less creative specimens than children who are just allowed to play. Other chapters deal with the effects of social facilitation and modeling on creativity. Though the experiments are reported in professional detail, their findings might not tell us much about creativity unless we are ready to agree that creativity is what expert judges say it is.

In any case, the volume is a serious attempt to cope with a fascinating phenomenon that is notoriously difficult to tackle with precision and grace. In focusing on the role of intrinsic motivation, and on the environmental factors that facilitate or hinder its manifestations, the author has made an important contribution. Those who fear that life would be impoverished if the mystery of creativity were to be unveiled need not worry, however; the solution is still well beyond our sights.

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A Development in Physics

Masers and Lasers. An Historical Approach. M. BERTOLOTTI. Hilger, Bristol, England, 1983 (U.S. distributor, Heyden, Philadelphia). xii, 268 pp., illus. $29.

This is a marvelous book for anyone interested in the origins of masers, lasers, and coherent optics. Bertolotti has searched the literature and has corresponded and talked with many of the principals in this dynamic field. He expounds the history of the subject with rigorous descriptions of the most important developments, usually with appropriate figures and equations. Arthur Schawlow, in a gracious foreword, suggests that the book could be used as an introducton to the theory of masers and lasers. This is so for persons with a background in quantum and classical physics. Its greatest value will nevertheless be to persons with some knowledge of the theory and an interest in its development.

Following a short introductory chapter, the historical account begins with a chapter on Einstein's 1916 explanation of stimulated emission and the subsequent discussion by spectroscopists of negative dispersion and negative absorption. Chapter 3, on magnetic resonance and optical pumping, is properly entitled "Intermezzo" since only part of it is directly related to the main theme of the book. Chapters 4 and 5 cover the decade of the '50's, when the maser was conceived, demonstrated, and extended into the solid state and the principles of the laser were clearly formulated. Chapter 6, entitled "The laser: further progress," describes Maiman's demonstration of the ruby laser and selected later developments. A final chapter discusses the history and principles of the statistical properties of light.

Biographical data are given for many of the principals, though the data are mostly limited to information on birth, education, and professional career. A notable exception is that the relationship between Bose and Einstein is described in interesting detail.

There is a minimum of the kind of speculation on the philosophical aspects of the subject that one would find in many histories of science. In the chapter on stimulated emission, which is subtitled "could the laser have been built more than 50 years ago?," Bertolotti points out that Ladenburg came very close to building a laser in 1921 and that many spectroscopists, starting with Kramers around 1925, used the term "negative absorption" and clearly understood that a wave passing through a medium with inverted population should increase in intensity. Townes has made much the same point, explaining that it was not until World War II, when physicists worked with radar, that there were persons who understood both the principles underlying this phenomenon and its practical significance. Another puzzle, only indirectly referred to in the book, is why it took so long for the laser to follow the maser when the laser now seems the simpler device. And how could so much of the basis for present quantum electronics have been set in the three or four years following Maiman's demonstration? The book contains many citations from papers and correspondence, so the reader can have fun speculating on these points.

The part of the history known at first hand to this reviewer is recounted accurately and without bias. The contributions of the Nobel laureates are well documented, as is important work by others, in both the West and the U.S.S.R. Especially interesting is the Gordon Gould story, since little of Gould's work was published through conventional channels. The source for the story in the book is apparently the testimony from the patent trials. In the chapter subtitled "further progress" some selection had to be made to keep the book within bounds. The chapter contains reasonable discussions of laser resonator theory and semiconductor lasers, with mention of several other laser types, but important subjects, such as nonlinear optics, ultra-short pulse formation, and spectroscopic applications, are omitted. The free-electron laser is discussed and is properly traced back to the Motz undulator; the controversy about whether it is really a quantum device is not stressed. In contrast, the chapter on laser statistics (one of the author's specialties) seems rigorous and complete and is developed in a most interesting manner.

Schawlow makes the point that each person involved in history sees events differently and that there will be inevitable differences of opinion about what to emphasize and even about facts. Nevertheless he finds the book a "sound outline of the way things developed." All of us who have tried to fill in parts of this complex history will agree.

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Some Other Books of Interest

Extinctions. MATTHEW H. NITECKI, Ed. University of Chicago Press, Chicago, 1984. x, 354 pp., illus. $30; paper, $16. From a symposium, Chicago, May 1983.

The contributions to this volume are based on papers presented at the Sixth Annual Spring Systematics Symposium held at the Field Museum. (For accounts of the symposium see J. Diamond, *Nature* **304**, 396 [1983] and R. Lewin, *Science* **220**, 1140 [1983] and **223**, 383 [1984]). The papers included are: "Death of species" by D. M. Raup; "Patterns of extinction in the fossil record of vascular plants" by A. H. Knoll; "Marine mass extinctions: a dominant role for temperatures" by S. M. Stanley; "Extinction in hominid evolution" by A. Walker; "Catastrophic extinctions and late Pleistocene Blitzkrieg: two radiocarbon tests" by Paul S. Martin; " 'Normal' extinctions of isolated populations" by J. M. Diamond; "Mammalian extinction and biogeography in the southern Rocky Mountains" by B. D. Patterson; and "Ecosystem decay of Amazon forest remnants" by T. E. Lovejoy *et al.* (A paper by Walter Alvarez presented at the symposium is not represented here.) Abstracts of the eight papers are gathered in an appendix, and author and subject indexes have been provided.—K.L.

Orders and Families of Recent Mammals of the World. SYDNEY ANDERSON and J. KNOX JONES, JR., Eds. Wiley-Interscience, New York, 1984. xiv, 686 pp., illus. $54.95.

This volume is a successor to *Recent Mammals of the World: A Synopsis of Families*, also edited by Anderson and Jones (Ronald, 1967; reviewed in *Science* **157**, 1420 [1967]). The new work, sponsored like its predecessor by the American Society of Mammalogists, is about 40 percent longer and has 13 new contributors. A general introduction by the editors is followed by an order-by-order discussion of the fossil histories of Recent mammals by M. R. Dawson and L. Krishtalka. The remainder of the chapters are devoted to the various orders. Monotremes and marsupials are dealt with by L. G. Marshall, insectivores, elephant shrews, tree shrews, and dermopterans by T. L. Yates, bats by K. F. Koopman, primates by R. W. Thorington, Jr., and S. Anderson, xenarthrans and pholidotes by J. C. Barlow, and lagomorphs by V. E. Diersing. The treatment of rodents comprises an introduction by M. D. Carleton and accounts of the various suborders by C. A. McLaughlin, Carleton and G. G. Musser, D. Klingener, and C. A. Woods. Cetaceans are dealt with by D. W. Rice, carnivores by H. J. Stains, tubulidentates, proboscideans, and hyracoideans by C. Jones, sirenians by G. B. Rathbun, perissodactyls by D. C. Carter, and artiodactyls by C. D. Simpson. For each family within an order information is given on diagnosis, general characters, habits, habitat, Recent distribution (including maps), Recent genera, geologic range, and major fossil groups. A 69-page section of references and an index of scientific (to the level of genus) and vernacular names are included.—K.L.

Books Received

Airlines of Latin America since 1919. R. E. G. Davies. Smithsonian Institution Press, Washington, D.C., 1984. xiv, 698 pp., illus. $47.50.

Amphibian Morphogenesis. Harold Fox. Humana, Clifton, N.J., 1984. xvi, 301 pp., illus. $59.50. Bioscience.

Animal Mechanics. R. McNeill Alexander. 2nd ed. Blackwell Scientific, Palo Alto, Calif., 1983. x, 301 pp., illus. $30. A Packard Publishing Limited Book.

Annual Review of Earth and Planetary Sciences. Vol. 12. George W. Wetherill, Arden L. Albee, and Francis G. Stehli, Eds. Annual Reviews, Palo Alto, Calif., 1984. x, 533 pp., illus. $44.

Annual Review of Public Health. Vol. 5. Lester Breslow, Jonathan E. Fielding, and Lester B. Lave, Eds. Annual Reviews, Palo Alto, Calif., 1984. viii, 473 pp. $27.

Antibodies: Their Structure and Function. M. W. Steward. Chapman and Hall, London, 1984 (U.S. distributor, Methuen, New York). 96 pp., illus. Paper, $6.95. Outline Studies in Biology.

Antimalarial Drugs II. Current Antimalarials and New Drug Developments. W. Peters and W. H. G. Richards, Eds. Springer-Verlag, New York, 1984. xviii, 520 pp., illus. $147. Handbook of Experimental Pharmacology, vol. 68/II.

Antiviral Chemotherapy, Interferons and Vaccines. David O. White. Karger, Basel, 1984. viii, 112 pp., illus. $46.25. Monographs in Virology, vol. 16.

Brücken: Ästhetik und Gestaltung. Bridges: Aesthetics and Design. Fritz Leonhardt. MIT Press, Cambridge, Mass., 1984. 308 pp., illus. $50. MIT Press Series in Structural Mechanics.

Butterflies East of the Great Plains. An Illustrated Natural History. Paul A. Opler and George O. Krizek. Johns Hopkins University Press, Baltimore, 1984. xviii, 294 pp., illus., + plates. $49.50.

Cancer Rehabilitation. Albert E. Gunn, Ed. Raven, New York, 1984. xiv, 223 pp., illus. $38.

Carbon-Functional Organosilicon Compounds. Vaclav Chvalovsky and Jon M. Bellama, Eds. Plenum, New York, 1984. xiv, 303 pp., illus. $45. Modern Inorganic Chemistry.

Carbonate Chemistry of Aquatic Systems. Vol. 2, High Salinity Waters. R. E. Loewenthal and G. v. R. Marais. Butterworths, Boston, 1984. Variously paged, illus. $39.95. An Ann Arbor Science Book.

Cardiology Update. Reviews for Physicians. 1984 Edition. Elliot Rapaport, Ed. Elsevier, New York, 1984. xvi, 245 pp., illus. $39.95.

Careers in Science. Thomas A. Easton. Dow Jones–Irwin, Homewood, Ill., 1984. x, 127 pp. Paper, $9.95.

Catalytic Conversions of Synthesis Gas and Alcohols to Chemicals. Richard G. Herman, Ed. Plenum, New York, 1984. xii, 475 pp., iilus. $69.50.

Cellular and Molecular Biology of Neuronal Development. Ira B. Black, Ed. Plenum, New York, 1984. xxvi, 363 pp., illus. $49.50. From a symposium, St. Thomas, U.S. Virgin Islands, March 1983.

Discourse Development. Progress in Cognitive Development Research. Stan A. Kuczaj, II, Ed. Springer-Verlag, New York, 1984. xvi, 203 pp., illus. $25.90. Springer Series in Cognitive Development.

Distributed Computer Control Systems 1983. M. G. Rodd, Ed. Published for the International Federation of Automatic Control by Pergamon, New York, 1984. x, 185 pp., illus. $56. IFAC Proceedings Series. From a workshop, Sabi-Sabi, Transvaal, South Africa, May 1983.

Drained Field Agriculture in Central and South America. J. P. Darch, Ed. B.A.R., Oxford, England, 1983. xiv, 263 pp., illus. Paper, £16. BAR International Series 189. From a congress, Manchester, 1982.

Drugs and the Lung. Gordon Cumming and Giovanni Bonsignore, Eds. Plenum, New York, 1984. viii, 285 pp., illus. $49.50. Ettore Majorana International Science Series, Life Sciences, vol. 14. From a school, June 1982.

Dynamic Semiconductor RAM Structures. A. Cardon and L. J. L. Fransen. Pergamon, New York, 1984. xxiv, 469 pp., illus. $95. EPO Applied Technology Series, vol. 1.

The Dynamics of Nuclear Proliferation. Stephen M. Meyer. University of Chicago Press, Chicago, 1984. xvi, 229 pp. $20.

Earthquake Engineering. Damage Assessment and Structural Design. S. F. Borg. Wiley Heyden, New York, 1984. xiv, 110 pp., illus. $21.95. Wiley Series in Methods and Applications in Civil Engineering.

Ecogenetics. Genetic Variation in Susceptibility to Environmental Agents. Edward J. Calabrese. Wiley-Interscience, New York, 1984. xvi, 341 pp., illus. $65. Environmental Science and Technology.

Forest Policy. A Contribution to Resource Development. F. C. Hummel, Ed. Nijhoff/Junk, The Hague, 1984 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xx, 310 pp., illus. $60. Forestry Sciences.

Foundations of Laser Spectroscopy. Stig Stenholm. Wiley-Interscience, New York, 1984. xiv, 268 pp., illus. $36.95.

Fuel Economy in Aviation. Jeffrey L. Ethell. National Aeronautics and Space Administration, Washington, D.C., 1983 (available from the Superintendent of Documents, Washington, D.C.). x, 111 pp., illus. $15. NASA SP-462.

Fuller's Earth. A Day with Bucky and the Kids. Richard J. Brenneman. St. Martin, New York, 1984. x, 180 pp., illus. $13.95.

Fundamentals of Meteorology. Louis J. Battan. 2nd ed. Prentice-Hall, Englewood Cliffs, N.J., 1984. xiv, 304 pp., illus. $26.95.

Galactic and Extragalactic Infrared Spectroscopy. M. F. Kessler and J. P. Phillips, Eds. Reidel, Boston, 1983 (distributor, Kluwer Boston, Hingham, Mass.). xii, 472 pp., illus. $58. Astrophysics and Space Science Library, vol. 108. From a symposium, Toledo, Spain, Dec. 1982.

Gas Transfer at Water Surfaces. Wilfried Brutsaert and Gerhard H. Jirka, Eds. Reidel, Boston, 1984 (distributor, Kluwer Boston, Hingham, Mass.). x, 641 pp., illus. $78. Water Science and Technology Library. From a symposium, Ithaca, N.Y., June 1983.

Gaseous Air Pollutants and Plant Metabolism. M. J. Koziol and F. R. Whatley, Eds. Butterworths, Boston, 1984. xiv, 466 pp., illus. $99.95. From a symposium, Oxford, England, Aug. 1982.

The Hidden Sun. Solar Eclipses and Astrophotography. James Lowenthal. Avon, New York, 1984. 108 pp., illus., + plates. Paper, $5.95.

Hospital with a Heart. Women Doctors and the Paradox of Separatism at the New England Hospital, 1862–1969. Virginia G. Drachman. Cornell University Press, Ithaca, N.Y., 1984. 259 pp., illus. $19.95.

How You Can Explore Higher Dimensions of Space and Time. T. B. Pawlicki. Prentice-Hall, Englewood Cliffs, N.J., 1984. xiv, 188 pp., illus. $16.95; paper, $6.95.

Human Anatomy. Kent M. Van De Graaff. Brown, Dubuque, Iowa, 1984. xviii, 677 pp., illus., + appendixes. $38.95.

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