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This Week in Science

Editorial

1089 Cancer Research: Prevention and Therapy

Letters

1090 Hood Lab Investigation: V. KUMAR; Response: E. E. SERCARZ; J. BRESSLER AND J. LATERRA

ScienceScope

1099 Commercializing a "Star Wars" cast off; foreseeing UC's financial future; etc.

News & Comment

1100 Weapons Labs: After the Cold War • Researchers Complain of Loss of Academic Freedom • Have Talent, Will Contract
1103 Now Dingell Probes the Academy!
1104 OSTP to Wade Into Gene Patent Quagmire
1105 FDA Committee Raises AIDS Vaccine Hurdles
1106 In Search of a New Cosmic Blueprint
1108 Neuroscience Meets the Big Easy: Patch Clamping au Naturel • Brain Grafts for Huntington's Disease Too Much Too Soon? • Retinoids May Help You See In More Ways Than One
1109 Galileo Hits Its Target
1110 Did a Rain of Comets Nurture Life?: Bringing in a Comet For Landing • A Cometary Source for Cockeyed Molecules?
1111 A Layer by Layer Look at the Skin Blister Diseases
1113 Briefings: Single-Celled Killer In Monterey Bay • Rx for Speedy Drug Approval • Tracking the AIDS Drugs • A Big Chill Grips Geothermal Energy

Research News

1114 Cancer Research in Europe: Europe: As Many Cancers as Cuisines
1116 Three Europeans Find Their Own Road to Fame: Life at the Front • A Pressure to Think • The Virtues of Patience
1117 Funding in Europe: How the Big Three Cope • Jacques Crozemanie: One Man and His Foundation

Articles

1131 Toward the Primary Prevention of Cancer: B. E. HENDERSON, R. K. ROSS, M. C. PIKE
1138 Tumor Suppressor Genes: R. A. WEINBERG
1146 Growth Factors and Cancer: S. A. AARONSON
1153 Chromosome Aberrations and Cancers: E. SOLOMON, J. BORROW, A. D. GODDARD
1161 Transgenic Models of Tumor Development: J. M. ADAMS AND S. CORY
1167 Viruses in Human Cancers: H. ZUR HAUSEN
1173 Recombinant Toxins for Cancer Treatment: I. PASTAN AND D. FITZGERALD

Reports

In this special issue, seven articles explore developments in basic and applied research that are increasing our understanding of the pathways leading to cancer. The syringe symbolizes the new approaches to prevention and therapy that are being developed and tested as a result of research advances. See pages 1131 to 1177. In addition, there is a special section highlighting personalities and issues in European cancer research. See pages 1114 to 1119. [Cover illustration by Julie Cherry]
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Cancer Research: Prevention and Therapy

Cancer is now one of the major causes of death in the United States, despite the fact that great advances are being made in its prevention and therapy. The reason is the precipitous decline in the heart disease mortality rate since 1950, as well as the harsh reality that we have not yet discovered the gene for immortality. Nevertheless, decreases in mortality and incidence of such cancers as Hodgkin’s disease, cervical cancer, and stomach cancer are typical of dramatic improvements through life-style changes, diagnosis, and treatment. However, lung cancer, which was rare in 1900, is now the current leading cause of cancer-related death, largely due to the legacy of widespread smoking.

In this special issue on cancer, assembled under the excellent editorial supervision of Senior Editor Barbara Jasny, changes in incidence and mortality for various types of cancer, preventive measures that have already had appreciable effects, and the possibilities of intervention to reduce risk of hormone-related cancer are discussed by Henderson, Ross, and Pike. Their review points out that changes in life-style, such as better nutritional choices or avoidance of tobacco, alcohol, and ultraviolet light, can have major effects on our risks of developing some of the most common cancers.

Aaronsen discusses the correlation of oncogenes with growth factors and components of their signaling pathways. Research has shown that many oncogenes are simply growth factors gone wrong—either overproduced or mutated so that they are active at inappropriate times. Applications of basic research are extensive; for example, inhibitors of tyrosine phosphorylation, the tyrophostins, have been used to inhibit the overactivation that can lead to uncontrolled cell growth. Weinberg discusses the inverse of overactivated growth factors—tumor suppressor genes that may communicate growth inhibitory signals to cells. The recognition that loss or inactivation of a tumor suppressor is an integral event in the development of many diseases, such as colon cancer and neurofibromatosis, has increased our knowledge and led to new treatment possibilities. In some cancers there is a chromosomal rearrangement, and the molecular biology and genetics of the altered chromosomal material, as explained by Solomon, Borrow, and Goddard, can reveal important clues to the genes involved in cancer.

Virus infections are associated with 15% of cancers in the world. As described by zur Hausen, modification of host genes or production of viral oncoproteins is involved in the cancers caused by the papilloma virus, Epstein-Barr virus, and hepatitis B virus; immunosuppression because of HIV infection increases the risk of Kaposi sarcomas and B cell lymphomas. Adams and Cory review the exciting advances in transgenic mice, in which the introduction of tumorigenic genes makes possible the identification and elucidation of the pathways by which tissue-specific cancers arise. In addition, the production of mouse strains that are predisposed to develop cancers provides invaluable tools for testing the carcinogenic potential of chemicals or evaluating possible new therapies. Pastan and FitzGerald discuss the targeted missile approach to cancer therapy; the attachment of a toxin to a growth factor or an antibody generates a lethal fusion protein that is specifically directed to the tumor cells.

The reader of this summary of the state of the art cannot help but be impressed by the enormous contributions made by basic research in general and molecular biology in particular. Many of the dramatically improved techniques in prevention and therapy derive from the general knowledge in such areas as nutrition, genetics, radiation effects, cell biology, and protein structure. A great deal of this knowledge has been focused and applied through recombinant DNA approaches to transgenic animals, viral infections, and hybrid protein construction. There are no problems more complex than cancer and few that are as important. The dramatic decreases in mortality and incidence for some types of cancer are a wonderful testimony to the success of these basic research approaches, but the remaining high mortality rate indicates there is still a great need for more research and more application.—DANIEL E. KOSHLAND, JR.
accusations against him because, until the very end of the investigation, no transcripts of the testimony of others were provided to him.

With a timely, yet thorough, local investigation, it should be unnecessary to make premature announcements that might have devastating consequences for the accused, such as the loss of a future job. In this case, it appears that Kumar "took the rap" for the trio of co-authors—Kumar, Urban, and Hood. Without protection for junior members of a laboratory, it will generally be the case that the university will seek to defend its top faculty: if someone is to be sacrificed, it clearly will be the junior scientist. Therefore, it is evident that current procedures chosen to examine scientific misconduct often subvert due process and may result in reaching incorrect conclusions. Simple changes would enhance fairness, for example, inviting external, nonuniversity members onto the investigative panels, as well as adoption of standard judicial safeguards, such as cross-examination and full disclosure.

**Eli E. Sercarz**
Department of Microbiology and Molecular Genetics, University of California, Los Angeles, CA 90024-1489

**REFERENCES**

Roberts describes Caltech's finding that data were fabricated and the subsequent withdrawal of several research papers in the laboratory of Leroy Hood, but does not discuss the core issues. What are the laboratory conditions that allow fraud to take place and who is ultimately responsible for the quality of work that gets reported?

Laboratory chiefs now appear to be judged by the appropriateness of their response to uncovered fraud and not by establishing laboratory conditions that guarantee that scientifically questionable or suspicious findings are not published. Only the principal investigator can be ultimately responsible, and we ask how a director, even one of Hood's caliber, can realistically extend that guarantee to 65 researchers, many of whom are trainees. In the not too distant past, principal investigators were involved in many steps of the research process, from bench to publisher. We need to return to this tradition. Paying more attention to the process of science is the only way we can guarantee the quality of its product.

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Antibodies

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<th>Ab-3*</th>
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size," and could also identify a minimum viable population size. If paternity analysis of a fruit crop indicated this number of different fathers, it would suggest that the population was safe. With genetic mosaicism at the levels we have shown, however, that number of fathers could be coming from a single tree, and despite the high genetic diversity, the population could have far fewer trees than necessary for phenological continuity and wasp maintenance.

Thus, the basic biology of strangler figs may be even more peculiar than has been supposed. These plants might profitably be compared to some of the sedentary invertebrates that often show fusions (19). Further investigation of allofusion frequency, allorecognition specificity, wood anatomy, physiological integration, and reproductive synchrony should improve conservation programs for this disproportionately important (1, 5, 6) component of tropical forests.

REFERENCES AND NOTES
21. We thank D. Snyderman for assistance, F. E. Putz for inspiring the study, and D. Windsor and the Smithsonian Tropical Research Institute for hospitality and funding. Numerous colleagues responded to our queries for information or commented on the manuscript, especially J. Bronstein, M. Geber, C. Augspurger, P. Raven, J. Kress, and J. Kuijt. J.D.T. and J.L.H. were additionally supported by NSF Contribution 797 in Ecology and Evolution, SUNY-Stony Brook.

28 May 1991; accepted 12 September 1991

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however. It is that a reformulation, particularly if more compact, does mean better understanding. Hamilton's mechanics were really those of Newton in disguise, but the equations were simpler and more symmetrical. One could say they contained no new physical concepts and be technically correct, but the later invention of quantum mechanics would have been almost impossible without Hamilton's work.

The great virtue of Field Theories of Condensed Matter is to have put all these things into one book and to have written it in a way that should be understandable to anyone willing to take the trouble. Just as important, the material is very much up-to-date. Work up to 1990 is included, even the latest on anyon theories of high-Tc superconductivity and Chern-Simons theories of the fractional quantum Hall effect. Unfortunately, the very timeliness of the book has the paradoxical effect of including some work that already now appears a bit dated. The chapter on spin-liquid states, though interesting enough, recounts a subject that flared up briefly and now seems to have disappeared. But the great mass of material included ensures that many things useful to the active researcher are there.

It is at this point in writing a review that one looks back and realizes that the reader probably will not be convinced that the reviewer has studied every page of the book in question. The temptation is great to prove diligence by citing a few misprints or errors, especially if the book is a thick and dense one. So let me point out that there is an error of a factor of 3/2 in the famous Stoner criterion on p. 28. The proofreading is in fact poor, and the book has a very large number of misspellings and misprints. These little matters could easily be taken care of in a second edition, but the author states in the introduction that a second edition will appear only if he "gets crazy enough to come back to this nightmare." I would like to wish the genial Professor Fradkin long life, sound mind, and maybe just one more nightmare or two.

ROBERT JOYNT
Department of Physics,
University of Wisconsin, Madison, WI 53706

Some Other Books of Interest


Hans Albert Einstein (1904-1973), the first of Albert Einstein's two sons, was educated in Zurich, became a hydraulic engineer, joined the faculty of the University of California at Berkeley in 1947, and married his second wife, neurochemist Elizabeth Roboz, in 1959. Before her death in 1958, Hans Albert's first wife had written a biography of her husband that drew upon the extensive correspondence between Albert Einstein and his first wife, Mileva Marić, Hans Albert's mother. Litigation by the Einstein Estate forced suppression of the manuscript and withholding of the correspondence until it eventually appears in Einstein's Collected Papers. Without the letters or other documentation, Elizabeth Roboz Einstein's warm reminiscences hardly differ from an afternoon conversation with a late arrival in-law of a famous family. The chat ranges over the entire family, including herself. But the emphasis is as much on Mileva as it is on Hans Albert, who is remembered for his pleasant nature and his independence from his father. The author portrays Mileva, whom she never met, as a long-suffering figure whom Albert rejected as a wife and refused to acknowledge for her contributions to his work. The latter assertion is repeated in an appendix on Mileva by Yugoslavian researcher Dord Krstic, but, as in the text, without any new supporting evidence. Two of Hans Albert's former students provide additional appendixes on his contributions to hydraulics.—David C. Cassidy, Hofstra University


The honoree of this volume shared a 1981 Nobel Prize for his work in laying the foundations of nonlinear optics. During his career at Harvard Bloembergen also directed the work of (in the words of John A. Armstrong) "quite a cast of characters," his students being a "highly international group" that included both theorists and experimentalists and both future university faculty and future corporate executives. Many of these and others of his associates attended the gathering in Cambridge that gave rise to this book. The book opens with a set of brief reminiscences in which Armstrong, Richard W. Damon, G. Durand, and Guo-zhen Yang variously comment on Bloembergen's role as mentor in the Golden Age of university research," describe this work done under his direction, and recount some of Bloembergen's interactions with Chinese physicists. There follow some 30 longer papers by the celebrants, technical in nature but also including some recollections of Bloembergen or comments on his work, grouped under the headings Spins, Stimulated Processes, Nonlinear Optics and Spectroscopy, Surface and Waveguide Nonlinear Optics, Ultrafast Interactions, Materials Science, and Structure and Dynamics. At the end of the volume are included reprints of four "key papers" authored or coauthored by Bloembergen: a discussion of the subject of his own thesis work, nuclear magnetic resonance absorption (1948), a "proposal for a new type solid state maser" (1956), a theoretical treatment of light waves in a nonlinear dielectric (1962), and his Nobel Prize lecture (1982). A bibliography of all Bloembergen's publications and a list of his former students and associates complete the tribute.—KATHERINE LIVINGSTON

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