than absence of the normal one) is the undesirable effect. This hypothesis might avoid the necessity of postulating that the sensitive substance is a very minor cell constituent and still fit a good many of the known facts.

Since x-ray or other high-energy damage is not photoreactivable, it is unlikely that the undesirable species is an unusual ion or simple free-radical, since such species are produced in abundance at high energies. Again we find the hypothesis attractive that some photooxidized species is most probably formed, and may be removed by reaction with a molecule excited by visible light, probably after the latter has gone over to the triplet state.

In this triplet-state hypothesis we cannot entirely rule out the reverse process—that the triplet molecule first reacts with oxygen to form a labile oxygen carrier able to oxidize a molecule photoreduced in the initial ultraviolet irradiation. On the whole, this process seems less probable than that suggested first, however. If it did actually occur, it seems likely that the peak in the action spectrum for photoreactivation might correspond to a peak for photodynamic killing. Although such a correlation has not been seriously investigated and therefore cannot be ruled out, there is no evidence to suggest that it occurs. This suggests that any triplet state-oxygen adduct formed is a harmless one and encourages us in the belief that the photoreactivation adduct is also harmless and that the triplet state may thus act as a scavenger of lethal oxidation products or radicals.

Damage by high-energy radiation. I do not propose to discuss this area in any detail, since, although an immense amount of work has been done, only the most general statements can be made about mechanism. The situation at present seems to be that we cannot even say with confidence what the major damaging effects are. The chromosomal apparatus, being delicate and fairly easily observed, has received a great deal of attention. If we try to visualize the outcome of the passage of a densely ionizing particle through an ordered, hydrogen-bonded macromolecule possessing a number of easily oxidized, reduced, or fragmented groups, the situation is understandably complex. We may expect radical recombinations of the fragmented backbone to cause gross changes which may be reflected at the microscopic level. Secondary electron bombardment will cause electron ejection and consequent oxidation of groups unaffected by normal oxidizing agents. Configuration changes or denaturation may occur because of gross breakage of many adjacent hydrogen bonds. Reducible groups will act as traps for slow electrons, and the delicate charge balance of the molecule will be severely upset. Very reactive free-radical fragments will attack undamaged species, producing macromolecules not normally encountered biologically. Superposed on these direct effects, the well-investigated "indirect effects" of attack by hydroxyl radicals (H_2O_2 and so on) formed from water will complicate the situation. Finally, dangerous autolytic processes may be induced by cell membrane discharge resulting from the unusual abundance of ions and electrons.

Many of these complex phenomena have been reported as identifiable results of radiation damage. It seems unlikely that we will obtain a very clear picture of their relative importance for a very long time, but meanwhile work of the kind that is in progress does focus attention on the biophysical aspects of biological survival and may well prove fruitful in the study of normal as well as of abnormal cell processes.

References and Notes

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Hans Friedrich Jensen, Biochemist

Hans Friedrich Jensen was born in Hamburg, Germany, on 5 July 1896, the son of Jens and Emmelie Jensen. He received his early education in Hamburg and served in the German army during World War I. It was not until 1921 that he received his Ph.D. in organic chemistry at Göttingen, working under the direction of Adolph Windaus. From 1921 to 1922 he served as assistant at the Kaiser Wilhelm Institut für Chemie, Berlin, and from 1922 to 1923, as assistant at the University of Göttingen. He came to this country in 1924 and served as assistant professor of chemistry at the University of Louisville until 1927. His dissertation at Göttingen had been concerned with some aspects of the chemistry of the imidazoles, and this interest in heterocyclic chemistry continued during the period of his stay at Louisville.

In 1927 Jensen joined Abel's group in the department of pharmacology at the Johns Hopkins School of Medicine immediately after Abel and Geiling had succeeded in crystallizing insulin. In association with Vincent DuVigneaud and Oscar Wintersteiner, Jensen collaborated in a series of three papers in which the three investigators demonstrated the polypeptide nature of the hormone. During the same period, through meeting K. K. Chen who was also in Abel's laboratory, Jensen became interested in the chemistry of the physiologically active substances present in various toad poisons—an interest which resulted in a series of some 20 publications, of which the last appeared in 1937. In 1933, on Abel's retirement, Jensen joined him in the Laboratory for Endocrine Research at Johns Hopkins and remained there until 1937, continuing work on the chemistry of insulin and of the toad poisons.

Jensen spent the years 1937–38 in the Institute of Experimental Biology in Berkeley, in collaboration with Simpson, Tolksdorf, Herbert Evans, and others on studies concerned with the chemistry of the hormones of the anterior lobe of the pituitary. In 1938 Jensen assumed charge of the Biochemistry Laboratory at the Squibb Institute, and in 1941 he became associated with the research staff of

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Upjohn and Company. He became a naturalized citizen of this country in 1944, and from 1944 to 1947 was director of research with Desbergers, Limited, of Canada. During these years his interest in the chemistry and physiology of the endocrine principles resulted in the publication of some dozen papers.

In 1947 he became director of the biochemistry department at the Army Medical Research Laboratory, Fort Knox, Kentucky, and was also made professorial associate in biochemistry at the University of Louisville School of Medicine. Between 1947 and the time of his death he published 35 papers on a variety of topics, especially on biochemical aspects of stress and on the mechanics of blood coagulation and fibrinolysis. He was in the middle of an active and productive program in this last area of interest when he died unexpectedly, on 30 September 1959. He is survived by Else Borgeest Jensen, whom he married in 1924.

He was a member of the American Society of Biological Chemists, the American Association for the Advancement of Science, the Society for Experimental Biology, the Association for Endocrine Research, the New York Academy of Science, the American Society of Hematology, and the International Society of Hematology.

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Science in the News

Salary Report Presented by University Professors' Group

American colleges and universities must "run fast" if they want to maintain their relative positions in the salary survey conducted by the American Association of University Professors, according to a report presented by Fritz Machlup of Johns Hopkins University on 8 April in Detroit, at the annual meeting of the AAUP. Machlup, who is chairman of the association's Committee Z on the Economic Status of the Profession, reported that for institutions submitting sufficient data for 1958–59 and 1959–60 to be included in the survey, the average increase in compensation for full-time faculty members during this period was 6.6 percent.

The percentage increases by academic rank range from 6.2 percent for instructors to 7.1 percent for professors. The results of the survey indicate that if this rate of increase is maintained, an institution will have to make a 7-percent adjustment every year to retain its relative position.

Institutions Improve Grades

Even more significant as an indication of salary trends is the information that 75 institutions, or more than one-third of the 213 submitting reports for both years, improved their grades in the Average-Compensation Scale. This grading scale, explained Machlup, is established by the association's Committee Z and is used to provide a limited amount of information regarding the salary structure at an institution.

While only one institution, Harvard University, received a grade of A last year in the Average-Compensation Scale, Princeton University also achieved the A grade for 1959–60. More significant changes occurred in other grade categories.

Among institutions that authorized publication of their salary indices, 18 received a grade of B in the Average-Compensation Scale last year, as compared with 27 this year. These latter include the following institutions: Amherst College; California Institute of Technology; the College of the City of New York; Columbia University; Columbia Teachers College; Cooper Union; Cornell University; Dartmouth College; Duke University; Haverford College; Hunter College; Indiana University; Johns Hopkins University; Northwestern University; Purdue University; Swarthmore College; the Universities of California, Chicago, Michi-