SCIENCE

1 August 1969
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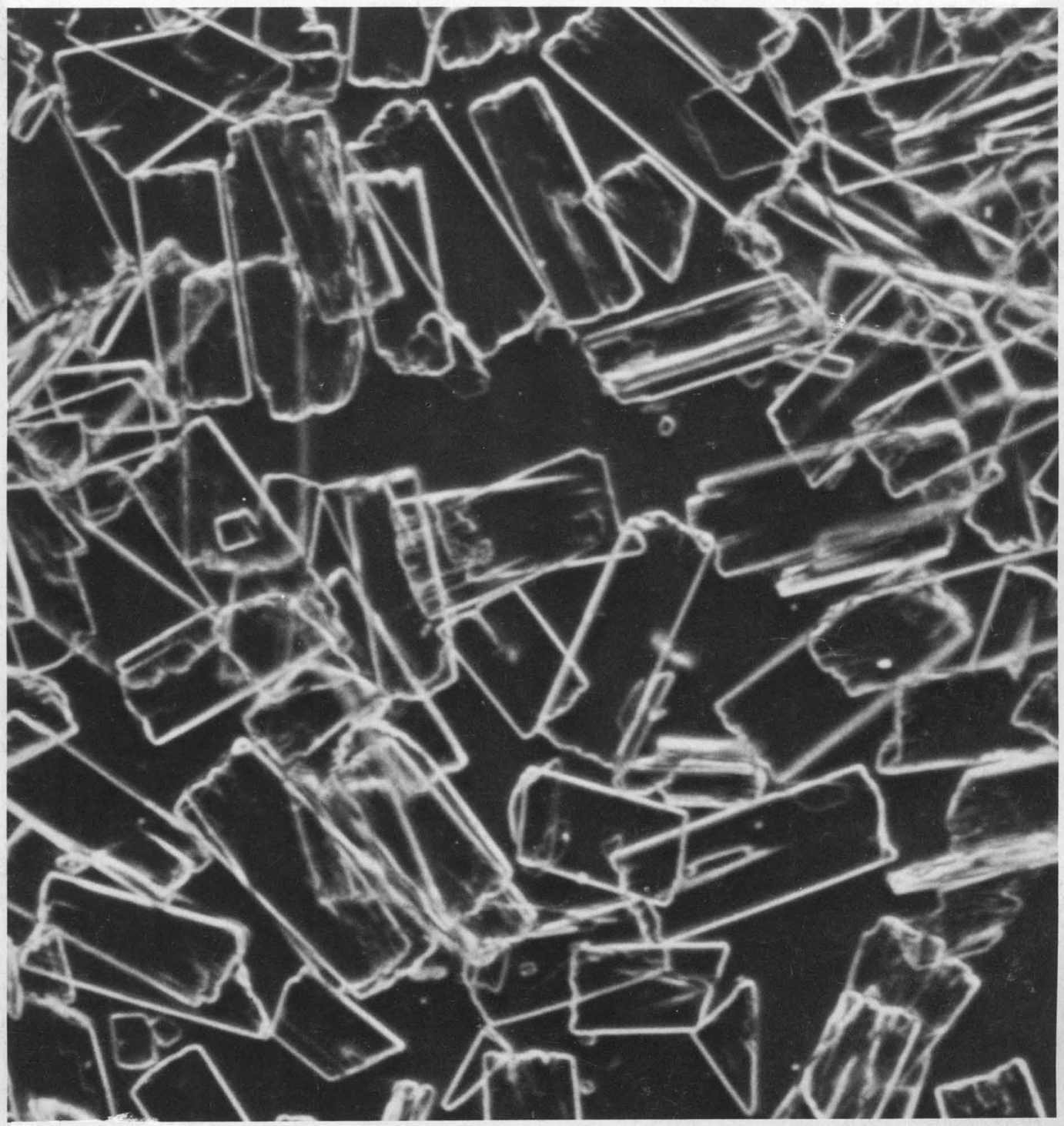
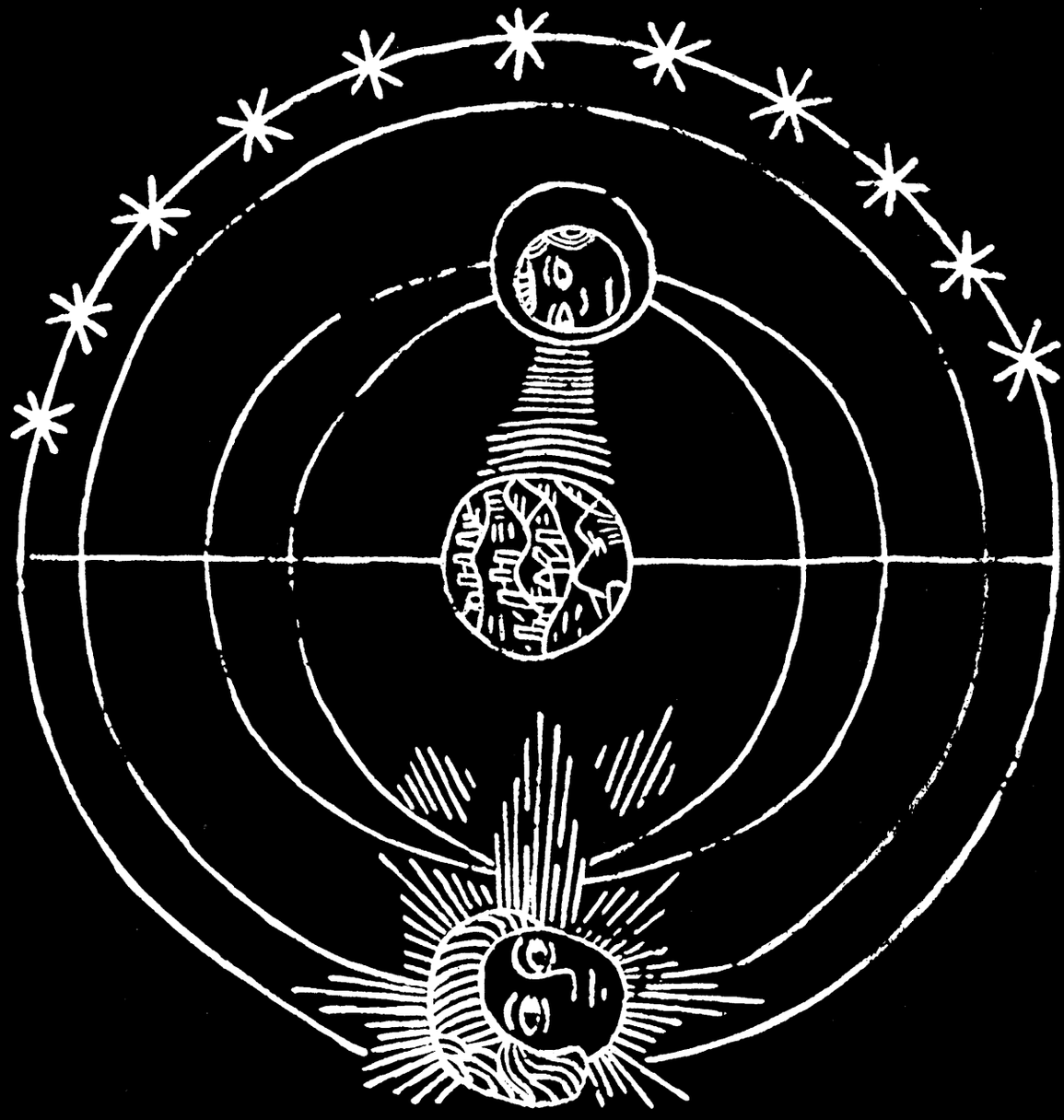
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





AAAS-WESTINGHOUSE SCIENCE WRITING AWARDS 1969

To encourage and recognize outstanding writing on the natural sciences and their engineering and technological applications (excluding medicine) in newspapers and general circulation magazines.

Three awards of $1000 each for science writing: in newspapers with daily circulation of over 100,000; in newspapers with daily circulation of less than 100,000; in general circulation magazines.

Contest year. Material must have been published within the United States, October 1, 1968, through September 30, 1969. Deadline date for submitting entries is October 10, 1969.

For entry blanks and detailed rules, contact Grayce A. Finger, Dept. W, American Association for the Advancement of Science, 1515 Massachusetts Avenue, N.W., Washington, D.C. 20005.

Founded on faith

"Lightly screened neutral donors at the inner edge of the depletion region account for intrinsic Appelbaum-Anderson zero bias anomalies in metal-semiconductor tunnel junctions. A negative g-shift and a natural Zeeman level width $\hbar/T_1$ for the localized magnetic moment are implied by the Appelbaum theory. These features are observed in the experimental results. . . . Since the same s-d exchange Hamiltonian applies both to the tunneling experiment and the dilute alloy problem, it appears that tunneling experiments . . . may permit direct measurement of previously inaccessible magnetic properties predicted for the Anderson model of dilute alloys. It is possible that our measured g-shift, in this sense, is the first direct observation of a large first-order Yosida g-shift."

—E. L. Wolf and D. L. Losee, Physics Division, Kodak Research Laboratories, in *Solid-State Communications 7:* 665 (1969)

Wolf and Losee need fields up to 150 kilogauss for much of this "zero-bias anomaly" work of theirs. For respectable fields you have to go to the Francis Bitter National Magnet Laboratory. After a while you sort of assume that no serious person would need to be told what a negative g-shift is. Actually, of course, not very many laboratories are known yet to be concentrating as hard as we are on experimental clarification and theoretical explication of these zero-bias anomalies in tunneling through a Schottky barrier.

—Laboratory Head, Solid State Laboratory

A Schottky barrier is a name given long ago to an insulating region that forms in a semiconductor when you put a metal of much different work function on the surface. Tunneling through it becomes a very simple idea with a little background in quantum mechanics and kind of a waste of time to talk about otherwise. It has had a play in the electronics business. Some day it could turn out to be useful in recording and displaying information.

—Physics Division Head

We are pleased to find ourselves in a position of some leadership in the exploration of these very fundamental phenomena. We don't know if or how this particular fraction of our work will bear a significant payout for the shareowners. But we need to understand how things behave to help in finding a more direct route to really new marketable technology.

—Research Director

You have to have faith.

—General management

Cold fireworks

The oxidation of one milliliter of a solution of 5-Amino-2,3-dihydro-1,4-phthalazinedione at a certain concentration can be counted upon to yield $9.75 \pm 0.7 \times 10^{14}$ photons of visible light. Hemoglobin—from your own finger if desired—can serve as the catalyst to raise the intensity to a level useful in absolute calibration of phototube detectors for the laboratory or the astrophysical observatory. Full details, including a discussion of emission spectra and spectral sensitivity considerations, begin on p. 35 of "Bioluminescence in Progress," Princeton University Press, 1966. The compound, better known as "luminol," is obtainable as EASTMAN Organic Chemical No. 3606 from any of eight laboratory suppliers: B&A, CURTIN, FISHER, HOWE & FRENCH, NORTHSTRONG, SARGENT-WELCH, VAN WATERS & ROGERS, or WILL.

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Crystals of L-asparaginase from *Escherichia coli* B. Partially purified L-asparaginase has demonstrable antileukemic activity in animals and man. Crystals of this enzyme, prepared by a simple and efficient process, were effective in experimental tumor systems without adverse side effects (about × 1300). See page 510. [Peter P. K. Ho, Lilly Research Laboratories, Eli Lilly and Company, Indianapolis, Indiana]

LETTERS

XYY Chromosome: Premature Conclusions

McWhirter's letter (6 June) gives the reader the erroneous impression that more is known about the association between the XYY karyotype and criminality than is actually the case. Our own review of the pertinent literature (currently in press in the *Journal of Psychiatric Research*) has led us to believe that no strong correlation exists between the presence of an extra Y chromosome and any specific behavioral, morphological, or physiological parameter. A tendency toward increased height may be an exception, but this too requires further study.

That XYY males are uncontrollably aggressive psychopaths appears to be nothing more than a myth promoted by the mass media. When compared to matched chromosomally normal fellow inmates, institutionalized XYY males seem to be less violent or aggressive and their preadmission histories generally involve crimes against property rather than persons. Several XYY individuals without behavioral dysfunction or criminal tendencies have already been identified.

The research on XYY individuals to date has not ruled out familial, social, and other nongenetic factors as the major determinants of the characteristics attributed to the extra Y chromosome. No direct comparisons of the actual home environments of XY and XYY males have been made. Also, there is no evidence whatsoever to indicate that XY and XYY males tend to differentially benefit from different rehabilitation procedures. Prospective studies of XYY individuals detected at birth may clarify some of the relevant factors that contribute to behavioral deviancies in some XYY individuals. However, the necessity of eliminating bias by investigators and of using adequately matched controls and double-blind procedures cannot be sufficiently emphasized. The legal and medical implications of findings in this area increase the usual responsibility of the investigator to be circumspect and cautious in drawing conclusions.

SEYMOUR KESSLER
RUDOLF H. MOOS
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Defoliants: Orange, White, and Blue

Galston points out (Letters, 25 Apr.) in his comments on the military uses of defoliants in Vietnam that the Department of Defense, according to Tschirley, is using picloram because there is not enough 2,4-D type herbicide produced in the United States to satisfy military requirements in Vietnam.

We recently returned from a short visit there and were told by chemical operations officers in Saigon that the reasons for the increased use of picloram are due to certain characteristics of agent Orange (2,4-D and 2,4,5-T) and agent White (picloram and 2,4-D). Drifting of the highly volatile agent Orange from target areas into the environs of Saigon poses a threat to crops and fruits in friendly areas. During trips around Saigon we saw much evidence of defoliation probably caused by this drifting. According to these officers, in the III Corps area, White is now being used almost exclusively because it is much less volatile than Orange and thus does not drift. In regions where there is little agriculture, however, Orange is preferred because it is more economical.

They also stated that in Vietnam now Orange constitutes about 50 percent of the total herbicides used, White 35 percent, and Blue (cacodylic acid) 15 percent. For whatever reasons, it is certain that use of White for defoliation in Vietnam is increasing despite the threat to Vietnamese agriculture by its persistence in the soil.

G. H. ORIANS
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Department of Zoology, University of Montana, Missoula 59801

Recent letters by biologists indicate overriding concern for the effects of defoliation in Vietnam on plants and animals there. Strangely, these letters pay little or no attention to the purpose of defoliating these jungle areas: namely, to save American and South Vietnamese lives. The concern is almost exclusively for plants and animals. No wonder that the opinions of most academic and scientific people regarding national and international matters command little respect. These opinions are too narrowly based on highly specialized interests; that is, the fate of a

particular animal species. Highly specialized as most of us are, we are not likely to see the whole picture and yet we take such outraged stands—as many doubtless will to this letter.

CLARENCE LEUBA
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Antioch College,
Yellow Springs, Ohio 45387

Evolution or Not

King and Jukes ("Non-Darwinian evolution," 16 May, p. 788) state that one thing the editor (natural selection) does *not* do is to remove changes which it is unable to perceive. If these changes cannot be perceived at the organismal level, are we dealing with evolution at all?

Evolution implies directed change. There is not and never has been, in neo-Darwinian thought, any quibble about the fact that change must come from random mutation at the molecular level. King and Jukes, in our opinion, are not discussing evolution at all as we define it, but the perpetuation of neutral mutations through random drift. Even here they admit that selection has played a part by eliminating lethal mutations. We do not regard perpetuation of neutral mutations as being evolution per se, but merely the pool from which evolution can occur, given a directed push by natural selection.

JOHN E. GUILDAY
MARY R. DAWSON
Section of Vertebrate Fossils,
Carnegie Museum,
Pittsburgh, Pennsylvania 15213

It is perfectly true that the molecular changes that we discussed are not evolution in the usual Darwinian sense, which is precisely why we used the term "non-Darwinian evolution." However, we see no advantage in considering nonadaptive characteristics as being outside the province of evolution, particularly since it is usually quite impossible to determine whether a given molecular change has been due to drift or selection. We believe that all heritable genetic changes which become stable species characteristics are included, or should be included, in the concept of evolution.

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The Control of Technology

It is often argued that science is morally neutral, neither good nor bad. If science is defined as man's accumulated knowledge about himself and his environment, then this is a defensible point of view. It is then technology or the application of science that raises moral, social, and economic issues. The great debate about the responsibility of scientists for the introduction of nuclear weapons has died down, but we are beginning to see that we are faced by a growing number of decisions about the future use of technology that, in total, may be much more important to mankind than even "the bomb."

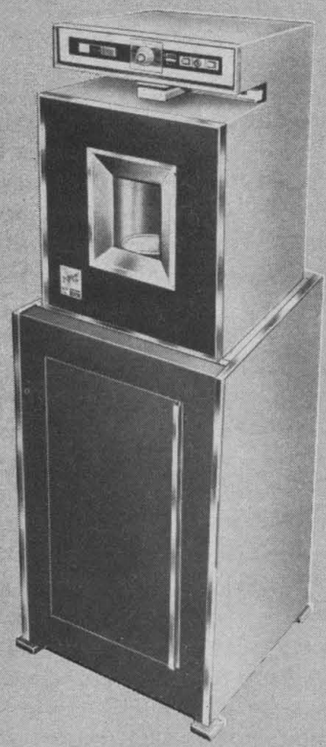
The tragedy of thalidomide is probably the most clear-cut recent example of the catastrophic effects that can result from a new application of technology where the preliminary research had not been carried far enough to reveal all the long-term effects. The present furor over DDT and other "hard" insecticides is an example of a more complex case of the same kind. The foreseeable dangers from the introduction of new technology range all the way from the relatively clear-cut cases such as thalidomide, to the more complex problems of the widespread use of supersonic aircraft, and on to the infinitely involved social and economic changes that will result from the widespread use of electronic systems for information management.

Society must so organize itself that a proportion of the very ablest and most imaginative of scientists are continually concerned with trying to foresee the long-term effects of new technology. Our present method of depending on the alertness of individuals to foresee danger and to form pressure groups that try to correct mistakes will not do for the future. A rational institutional framework that will assign a formal responsibility for this critical task to a well-selected, well-organized, and well-financed group of scientists is urgently needed. Clearly, this agency must also have strong representation from the social sciences, including law, and close links with political leaders and with "the man in the street." Its task is too important to be left to scientists alone, but scientists must supply the leadership.

In this problem, as in so many, mankind is steering a precarious course between Scylla and Charybdis. On one hand are the dangers of the uncontrolled exploitation of new technology, and on the other are the dangers of such rigid control that progress will cease. Obviously action must begin in individual nations, but it should quickly become international in scope because so many of the potential problems are worldwide. Fortunately we have made a beginning. Suitable control mechanisms have already been formed or are being considered in many areas, such as food and drugs, where the hazards are clear and obvious. The problem now is to extend the same kind of control to broader problems where long-term dangers are potentially more serious and the task of forecasting is much more difficult.—O. M. SOLANDT, *Chairman, Science Council of Canada, Ottawa*

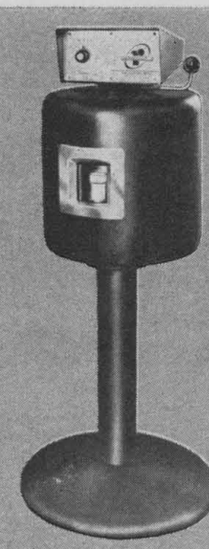
RMC Products in Education, Science and Medicine

Gammator Series Gamma Irradiators



A sophisticated series of gamma irradiators providing exposure rates up to 150,000 r/hour. Two chamber sizes, 3"x4" and 3"x8", are offered, as well as a dose rate control, electric timer, automatic sample return and access tubes. Considerably less expensive than other units of comparable capabilities, they are ideal for research projects where immediate access to high intensity radioactive source is essential. Described in publication GS-1 (Industrial) GM-1 (Medical)

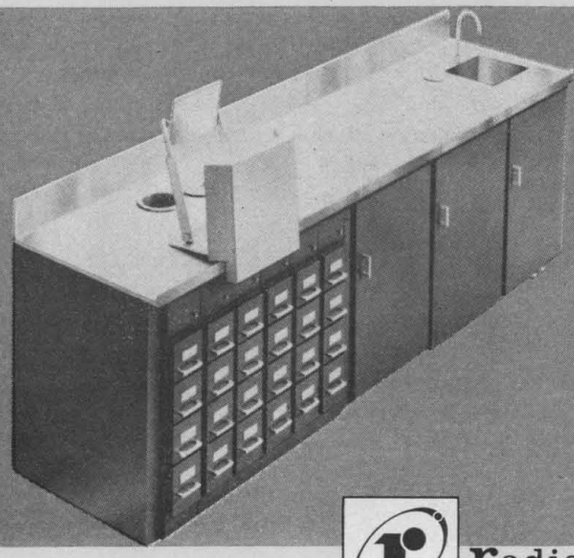
Gammator B Gamma Irradiator



The Gammator B is a low cost irradiator that may be used in unrestricted laboratory areas in high schools and colleges. It provides an exposure rate of 35,000 r/hour at the centerline of the sample irradiation chamber. Standard equipment includes a 4 rpm irradiation chamber turntable, electric timer, attention bell, and indicator lights. With the Gammator B, students have, for the first time, access to experiments with a high intensity radioactive source. Thousands of original experiments in physics, chemistry, zoology and botany can be carried out in complete safety. Described in publication GB-1000 (high schools) GB-1003 (colleges)

Portable Extracorporeal Beta Irradiator

The RMC extracorporeal beta irradiator has application for treatment of various forms of leukemia, and for immuno-suppression in organ transplants and grafts. This irradiator is light enough to be brought to a patient's bedside. Its beta source is 100 times as effective as gamma or x-rays. At a flow rate of 6 ml/min, lymph fluid would receive 2900 rads/transit. Described in publication ECI-1



Radioisotope Work Station

The RMC Radioisotope Work Station is used for storing and handling radioisotopes. Modular add-a-unit design lets you choose from storage, waste disposal, refrigerator and sink units. Storage units with either 12 or 24 drawers may be selected. The storage area is lined with 1 inch of lead for complete safety. A sliding lead shield with rear mirror permits the operator to handle radioisotopes while viewing them indirectly. Described in publication IWS-1.

Radiation Machinery Corporation
1280 Route 46, Parsippany, New Jersey 07054 (201) 887-4700