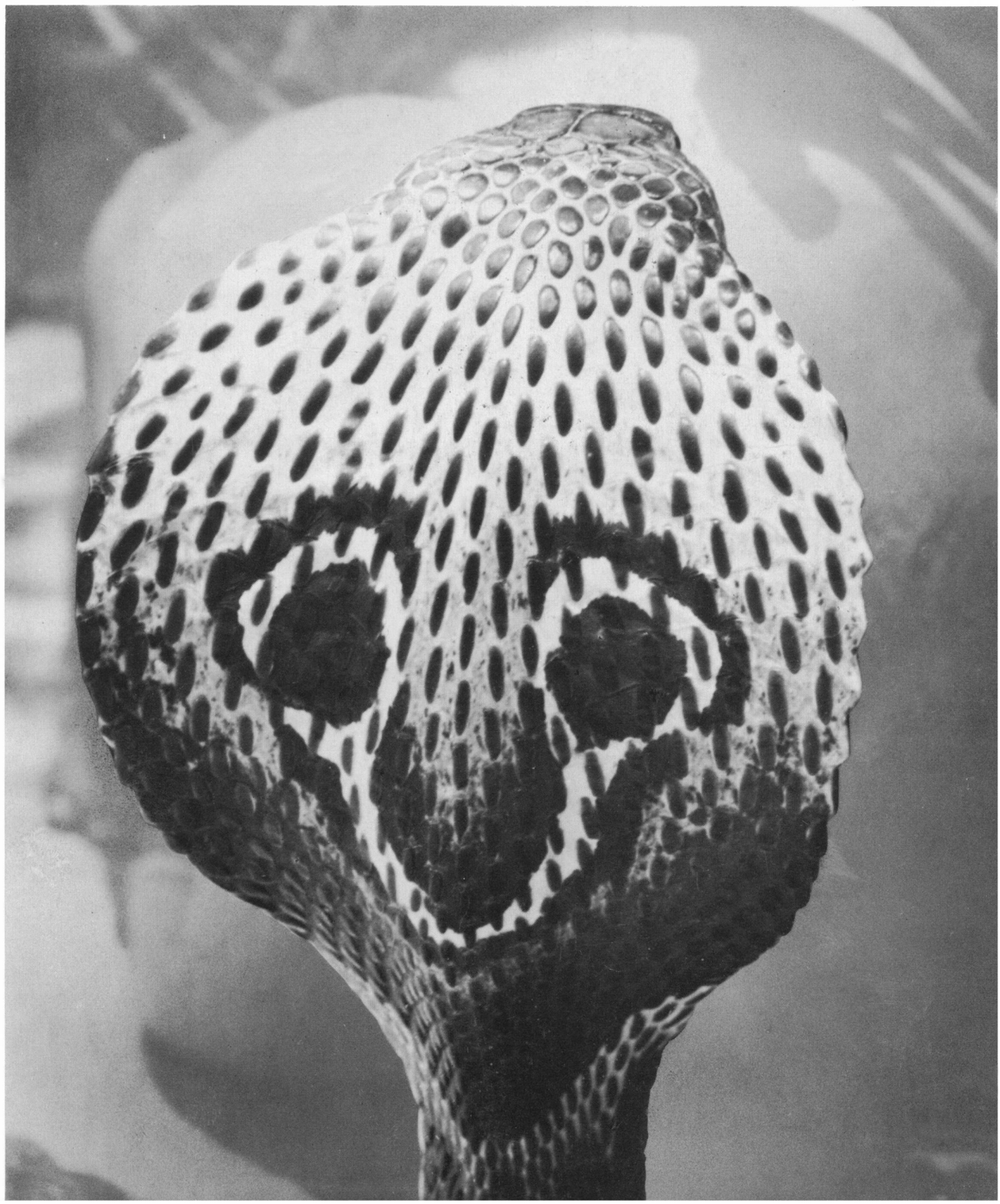
SCIENCE

10 March 1961

Vol. 133, No. 3454

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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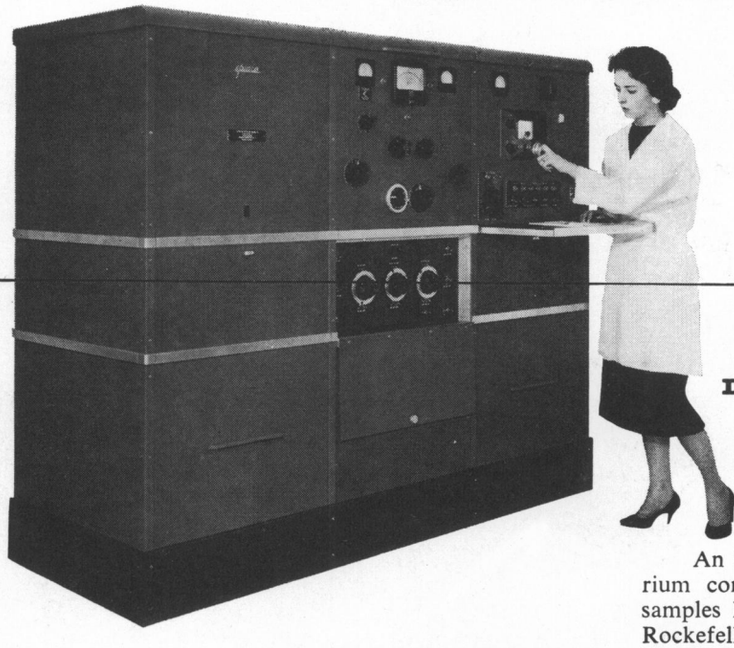
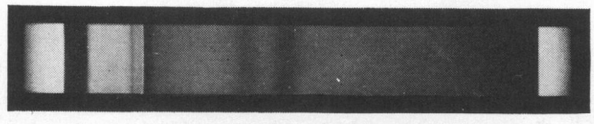


Density Gradients

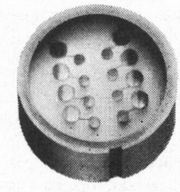
Macromolecules of nearly identical density can be separated and measured by the powerful, rapidly developing technique of density gradient ultracentrifugation. A solution such as cesium chloride is centrifuged with the sample and a concentration gradient created in the cell by centrifugal force. The macromolecules of sample seek the level in the cell corresponding to their own density. The resultant discrete bands can be photographed by absorption optics.



An example of the extreme power of this method is shown here in the separation of DNA's, one containing N_{14}, the other N_{15}.

A summary of density gradient techniques for both analytical and preparative ultracentrifuges has been published by Spinco and copies are available on request.

Rapid Molecular Weight Determinations of Multiple Samples



An ingenious ultracentrifuge cell in which equilibrium conditions can be reached rapidly on multiple samples has been described by David Yphantis of the Rockefeller Institute.

The cell features multiple filling reservoirs and measuring chambers which allow a number of sample-solvent pairs to be studied simultaneously. The use of short column heights makes it possible to establish equilibrium conditions quickly. With an 0.8 mm column, equilibrium is attained in 15 minutes for sucrose (M.W.=342), 45 minutes for ribonuclease (M.W.=13,683), and 70 minutes for bovine serum albumin (M.W.=66,000).

The need for only a small volume of sample is another feature of this unusual cell which promises to find wide appplication for rapid measurements of molecular weight.

Sedimentation of High Polymers

Of special interest to polymer chemists is a comprehensive summary on sedimentation of synthetic and natural polymers by R. L. Baldwin of the University of Wisconsin (now at Stanford) and K. E. Van Holde of the University of Illinois. The authors discuss in detail the kinds of information obtainable by ultracentrifugation, and methods used. An appendix lists polymers run on the Ultracentrifuge, solvents, and literature references.

The work appeared in the first issue of the German journal "Advances in Polymer Science"; reprints (in English) are available from Spinco.

If you are not familiar with the Ultracentrifuge, we will be happy to send you copies of "An Introduction to Ultracentrifuge Techniques" and the latest issue of "Fractions", a periodical sent to owners of Spinco ultracentrifuges, electrophoresis-diffusion instruments and amino acid analyzers. Write Beckman Instruments, Inc., Spinco Div., Stanford Industrial Park, Palo Alto 5, Calif.

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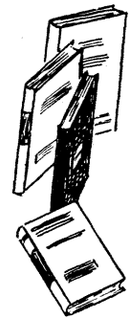

By ROBERT B. FISCHER, Ph.D., Professor of Chemistry, Indiana University. About 535 pages, 6⅛" x 9¼", illustrated. About $6.75. **New (2nd) Edition—Ready in April!**

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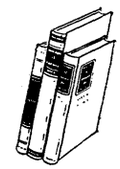

By PHILIP L. CARPENTER, Ph.D., Professor of Bacteriology, University of Rhode Island. About 480 pages, 6⅝" x 9¾", with 246 illustrations. About $6.75. **New—Ready in April!**

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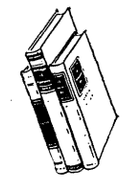
A study of vertebrate animals of North America for students of zoology, science teachers in training, and students of conservation and wildlife. The five types of vertebrates are covered in detail—fishes, amphibians, reptiles, birds and mammals. Each is covered in a separate chapter outlining general and specific characteristics. Methods of classifying the vertebrate animals are discussed in a chapter on systematics. The author examines the regional distribution of the vertebrates and the territory and home range of each. In a chapter on population movements, you'll find migration, emigration and dispersal fully discussed. Another chapter covers dormancy in relation to each of the types of vertebrates, considering those physiological factors associated with it—temperature, metabolism, circulatory system, endocrine and nervous systems. In the discussion on reproduction, the author covers sex recognition, courtship and pair formation. The chapter on growth and development includes the pre-natal period, birth and the post-natal period, as well as the age criteria for each group. A final chapter on population dynamics includes material on reproduction, mortality, food, and competition.



By ROBERT T. ORR, Ph.D., Curator of Birds and Mammals, California Academy of Sciences; Professor of Biology, University of San Francisco. About 448 pages, 6⅛" x 9¼", with about 157 illustrations. About $7.50. **New—Ready in April!**

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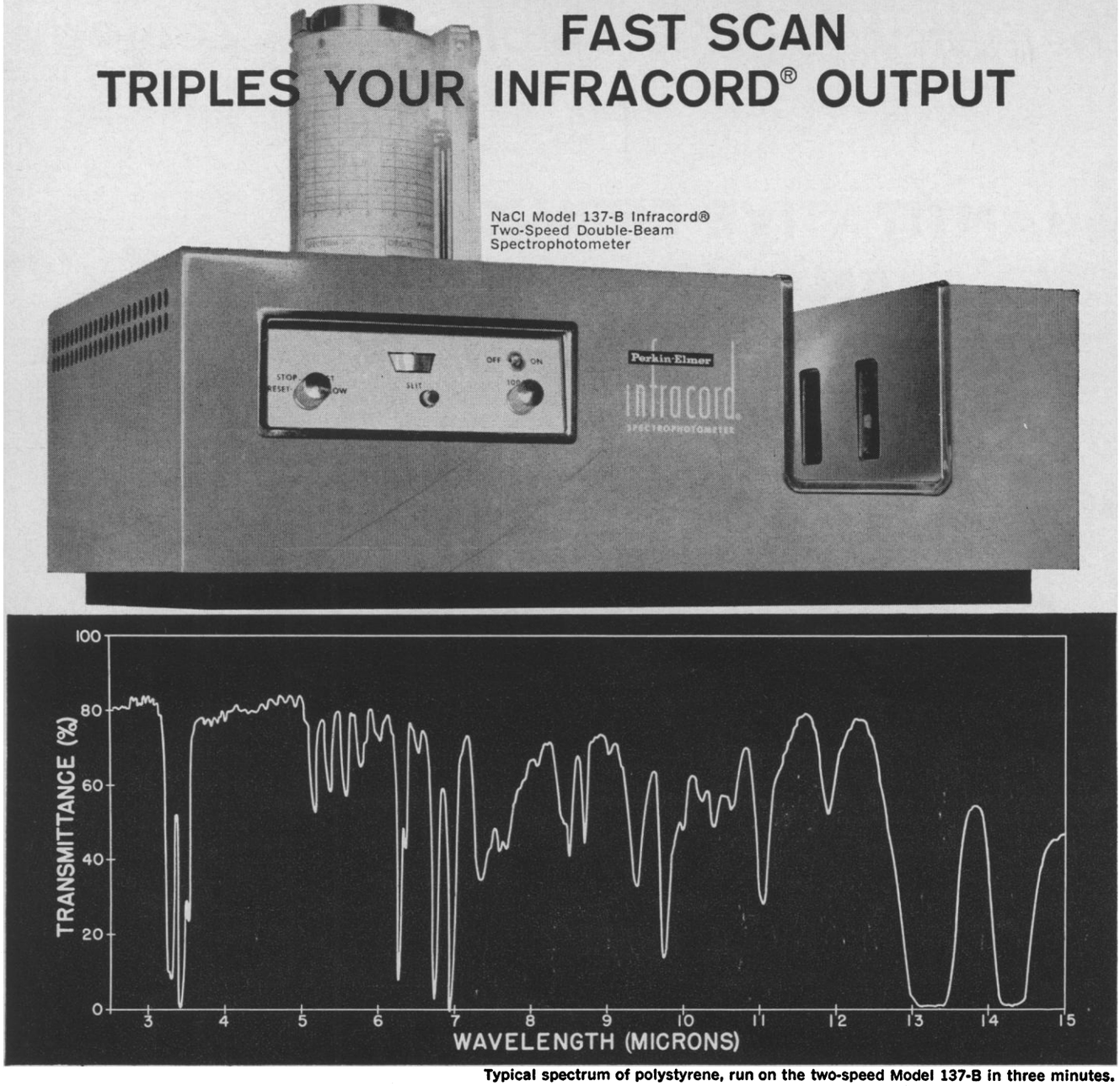

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Cover

Hood of a Ceylon cobra, *Naja naja* (L.), also known as the spectacled cobra. These snakes are found in abundance in lowland jungles. This particular specimen has been aroused by a snake charmer and has distended its hood as a warning signal. The distention causes the scales to separate, showing the "spectacles" in bold relief. [Reg van Cuÿlenburg, Tucson, Ariz.]

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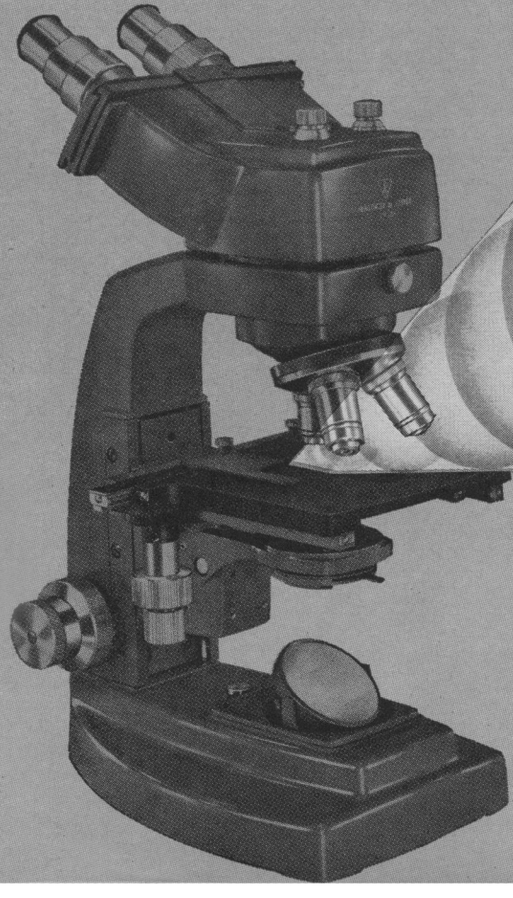

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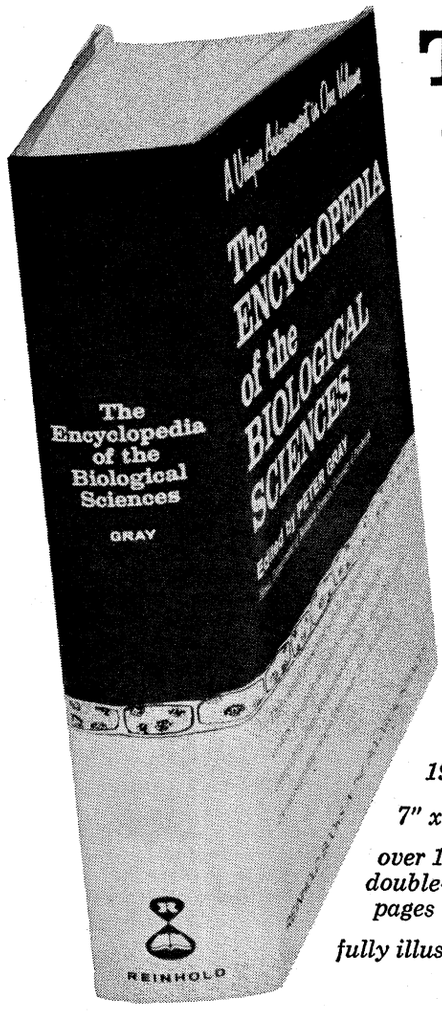

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About the Editor: Since 1926, Professor Peter Gray has had published numerous papers on a variety of biological subjects, and has himself contributed to several encyclopedias. He received his doctorate in 1931 from the University of London before launching an extensive career of lecturing and research. He joined the faculty of the University of Pittsburgh in 1939, and became Head of the Department of Biological Sciences in 1947. He is a member of eleven professional societies, in addition to being an editor of *Biological Abstracts*. His determined efforts and editorial talents have contributed greatly to making *The Encyclopedia of the Biological Sciences* a significant milestone in the history of scientific literature.

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Unhappy Paradox

Modern agricultural production is a triumph of the application of knowledge derived from basic research to problems of human nutrition and welfare. During the past quarter century agricultural practice has undergone a full-scale revolution as a result of the integrated application of many technologies to the total problem of crop and animal production, nutrition, protection, and utilization. Advances in the engineering, chemical, physical, and biological sciences have in the most highly developed countries of the world permitted qualitative and quantitative improvements in agricultural production in new orders of magnitude and at the same time have pointed the way to future improvements of similar or even greater dimensions.

The secret of this success story lies in men rather than machines. The outpouring of trained scientists and others destined to work in some aspect of agriculture has made possible extraordinarily creative and exceedingly rapid advances in science and technology. The agricultural producers in the industrial countries are highly sophisticated groups who have taken full advantage of available knowledge and tools, with the result that production has steadily increased, while manpower requirements and costs have simultaneously declined. Thus, today the citizens of Western and certain other nations are able to enjoy appetizing, high-quality, and nutritious domestic and exotic foods without seasonal limitations and at reasonable prices. However, regardless of past achievements, it is entirely clear that future advances in response to the demands of a growing population are going to require more extensive and greatly intensified scientific research and development.

With the knowledge and tools now available to society for the satisfaction of agricultural requirements, it seems paradoxical that a large proportion of the world's population lives at substandard nutritional levels. It is frequently suggested that the massive application everywhere of modern technologies could readily eliminate the specter of hunger which stalks so many lands; theoretically, such massive application could be carried out, but in practice this is impossible.

The great barrier is now, and will continue to be for a substantial period in the future, the lack of sufficient numbers of nationals able to participate in research and to contribute otherwise to the development and application of technologies in support of progress on all fronts. Thus, the future economic growth of many of the less well-developed nations of the world will depend precisely upon the rapidity with which their citizens can be trained for the multiplicity of responsibilities related to agricultural production, distribution, marketing, and utilization and attendant occupations.

Friendly nations cannot resolve the problems of the less well-developed or emerging countries, but they can help to speed the processes of social and economic growth. Efforts should include industrial and engineering projects, but more fundamentally they must emphasize education at all levels. Especially important is the utilization of technical assistance programs as intensive training media. Training abroad for special purposes is vitally important, but the broad base for economic growth and social progress is to be found at home, through interrelated programs designed to prepare growing numbers of nationals to respond to the demands of evolving social patterns.—J. G. HARRAR, *Rockefeller Foundation, New York.*

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Meetings

Stebinger Memorial Symposium

The First Stebinger Memorial Symposium was held at Northwestern University on 3 December 1960. The conference was attended by about 70 engineers and geologists from Canada, Mexico, and the United States.

The program emphasized foundation problems in surficial materials and included such topics as impregnation and consolidation of granular material by chemical methods such as cementing and clay grouting.

Emile Huni, chief engineer of the Soletanche Company in Vancouver, discussed methods of impregnating deep glacial alluvial fill in southern France and in northwestern Canada in order to render it impermeable. Joseph Ramos of the Halliburton Company spoke on chemical grouting, giving numerous illustrations of specific uses in dams and foundations. J. M. Edwards of the McCullough Tool Company discussed the gamma-gamma or density logging device, as developed for oil exploration, and considered its application in determining porosity and permeability in rocks or soils.

A lively discussion period occupied the last part of the morning session. This discussion was moderated by Shailer S. Philbrick, division geologist, Corps of Engineers, Pittsburgh, and visiting lecturer in geology at Northwestern University for the fall quarter of 1960. Parker D. Trask of the Engineering College, University of California, opened the discussion by bringing out recent developments in the study of water in sediments. Arthur B. Cleaves of Washington University, St. Louis, cited specific problems encountered in tunneling operations and pointed out some major problems in shutting off water.

The afternoon session was devoted to the legal aspects of engineering and geology as they affect decisions in landslide liability, water legislation, and the general problem of the responsibility of engineers. This part of the symposium was led by George A. Kiersch of Cornell University.

The late Eugene Stebinger, in whose honor the symposium was held, became affiliated with the United States Geological Survey after attending the universities of California and Chicago. Later he joined the Standard Oil Company (New Jersey) as chief geologist in Argentina and Bolivia, and later as president of the Standard Oil Company of Bolivia. On his return from South America he became chief geologist of Jersey Standard until his retirement in 1945. He died in 1951.

Mrs. Stebinger and her son Arnold, who is presently on the staff of Socony Mobiloil, donated Eugene Stebinger's library to the University of Illinois in Chicago, and the Standard Oil Company (New Jersey) established the Stebinger Memorial Fund with a substantial donation.

The symposium was arranged by Robert W. Karpinski in collaboration with J. Osterberg of the civil engineering department of Northwestern University and with the cooperation of A. L. Howland of the geology department. H. B. Gotaas and F. Trezise, deans of Northwestern and of the University of Illinois, respectively, attended the meetings.

It is anticipated that additional symposia will be held under the auspices of the Eugene Stebinger Memorial at two-year intervals, with emphasis on problems in the borderland between engineering and geology. Inquiries regarding future symposia are welcomed.

ROBERT W. KARPINSKI
University of Illinois, Chicago

Forthcoming Events

April

4–8. National Council of Teachers of Mathematics, 39th annual, Chicago, Ill. (F. A. Janacek, J. S. Morton High School, Cicero 50, Ill.)

5–8. Water Relations of Plants, British Ecological Soc., symp., London. (F. H. Whitehead, Botany Department, Imperial College, Prince Consort Road, London, S.W.7)

6–7. Council on Medical Television, annual, Bethesda, Md. (Institute for Advancement of Medical Communication, 33 E. 68 St., New York 21)

7–8. Eastern Psychological Association, Philadelphia, Pa. (C. H. Rush, P.O. Box 252, Glenbrook, Conn.)

7–9. American Assoc. for Cancer Research, 52nd annual, Atlantic City, N.J. (H. J. Creech, Secretary-Treasurer, Inst. for Cancer Research, Fox Chase, Philadelphia 11, Pa.)

7–9. Fleming's Lysozyme, 2nd intern. symp., Milan, Italy. (R. Ferrari, Organizing Committee, Via Modica 6, Milan)

8–9. Histochemical Soc., 12th annual, Atlantic City, N.J. (H. W. Deane, Albert Einstein College of Medicine, Bronx 61, N.Y.)

9–13. American Assoc. of Cereal Chemists, annual, Dallas, Tex. (J. W. Pence, Western Utilization Research & Development Division, 800 Buchanan St., Albany 10, Calif.)

9–13. American Industrial Hygiene Assoc., Detroit, Mich. (W. S. Johnson, Bethlehem Steel Co., Bethlehem, Pa.)

9–15. American Institute of Nutrition, Atlantic City, N.J. (A. E. Schaefer, ICNND, Bldg. 16A, National Institutes of Health, Bethesda 14, Md.)

10–14. American Soc. of Civil Engineers, Phoenix, Ariz. (W. H. Wisely, 33 W. 39 St., New York 18)

10–14. Detection and Use of Tritium in

Kodak reports on:

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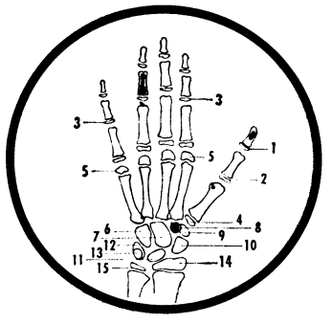
Status of ossification



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   Appear 5M–2½Y
   Fuse 14–21Y
4. **Metacarpal I, Epiphysis**
   Appears ♂2½Y ♀1⅔Y
   Range ♂1½–3½Y ♀1–2Y
   Fuses 14–21Y
5. **Metacarpals II-V, Epiphyses**
   Appear 1–1½Y
   Range 10M–2Y
   Fuse 14–21Y
6. **Hamate**
   Appears 6M
   Range Birth–1½Y
7. **Capitate**
   Appears 6M
   Range Birth–1Y
8. **Trapezium**
   Appears ♂5Y ♀4Y
   Range 1½–10Y
9. **Trapezoid**
   Appears ♂6Y ♀4Y
   Range 2½–9Y
10. **Scaphoid**
    Appears ♂5½Y ♀4½Y
    Range 2½–9Y
11. **Lunate**
    Appears 4Y
    Range 6M–9½Y
12. **Pisiform**
    Appears ♂11Y ♀9Y
    Range 6½–16½Y
13. **Triquetrum**
    Appears ♂2¼Y ♀1¾Y
    Range 6M–4Y
14. **Radius, Distal Epiphysis**
    Appears 1Y
    Range 3M–1½Y
    Fuses to Shaft ♂19Y ♀17Y
15. **Ulna, Distal Epiphysis**
    Appears ♂6Y ♀5Y
    Range 4–9Y
    Fuses to Shaft ♂19Y ♀17Y

This is part of a 37″ x 28″ chart we have put out. It may be useful to guide the gauging of physiologic age and metabolic status of children and adolescents by means of radiography. The chart gives other such radiograph tracings with similar data for the elbow, knee joint, foot and ankle, shoulder, hip joint, and fetal skeleton. Maturation schedule depends of course on nutrition, genetics, and, conceivably, climate. This particular chart is based on the experience of Dr. R. Hugo Mackay of University College Hospital in London with British youngsters.

All told, we have had perhaps 50 suggestions from radiologists that we publish such a chart. Correlation between the good will of radiologists and the success of Kodak Blue Brand *and* Royal Blue Medical X-ray Film *is so high that 50 radiologists dropping casual comment on a subject over a span of years make a noise that sounds to us like an irresistible clamor. A student or other interested party who is not a practicing radiologist can obtain a notebook-punched 16½″ x 10″ version of the chart by request to Eastman Kodak Company, X-ray Division, Rochester 4, N. Y.*

The student who took advice

So much buy, buy, buy on all sides! Many a scientific man says the clamor is too overwhelming. Perhaps it is unwise to irk him further by suggesting that his own kind bears no small part of the credit for having caused the din to be set up.

In the early 1900s Sir William Ramsay, the physical chemist who discovered the noble gases, strongly advised a student of his named Mees to get a job in industry instead of following the traditional scientist's livelihood of teaching. The young fellow therefore went to work for Wratten & Wainwright, a small firm that made photographic plates. Actually, until not so long before, Mrs. Wratten, the senior partner's wife, had been making them in her kitchen, quite successfully flowing the emulsion from a teakettle onto glass.

But young Mees brought science into the operation. The union of science and industry was blessed with new products for Wratten & Wainwright. They attracted the attention of Mr. Eastman, of Kodak, who decided it would be good for *his* business, too, to apply some science to it. Instead of emulating Wratten & Wainwright, he bought their business and brought Mees to Rochester, N. Y., U.S.A., as Kodak's research director. This happened in 1912.

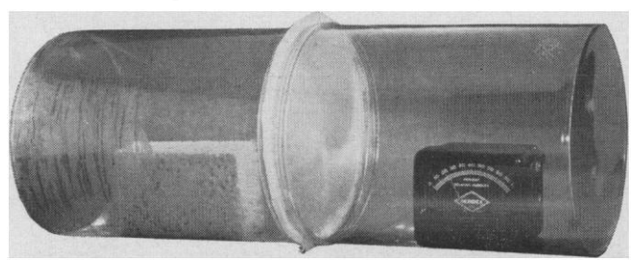
After 43 years in the job, Mees retired and wrote a book about his experiences in nurturing the chemistry and physics of one industry to churn out the stuff that has to be bought, bought, bought. His long, happy, and fruitful life ended last year. This month the book will be coming out under the title "From Dry Plates to Ektachrome Film" (Ziff-Davis Publishing Co., New York, $5.95 at many camera shops). It is recommended to those who want a very grown-up viewpoint on photography and its technology. It may also prove instructive to scientists in general who have made or are contemplating a switch from the world of scholarship to the world of commerce.

New and edible

The general public doesn't realize that we produce edible products with calories in them that a person can grow on and do pushups with. The newest of them bear the colorless designation "distilled acetylated monoglycerides." In front of the ungainly generic name we stick the trademark "Myvacet," which is easier to remember and shows we mean business. So far the business is confined to operating a small pilot plant and sending out technical salesmen to get food laboratories to accept samples with which to play and plan.

First the salesmen establish the distinction from *un*acetylated monoglycerides, another and equally real food which we have been producing by the ton for years as a texture-improver for fat-based foods and more recently for starch-based ones.

Then the salesmen undertake their mission of inspiration. They show this picture to fix in mind that "Myvacet" makes



a most effective barrier to water vapor. It also bars oxygen but not carbon dioxide. The solid "Myvacet, Type 5-00"* is far more flexible when cold than paraffin wax, which it resembles in feel and appearance but not in chemical nature.

The liquid "Myvacet, Type 9-40"** is a better gear and bearing lubricant, even under high pressures, than many petroleum-based products, yet, like the solid, it is unquestionably and officially*** edible and at the same time outlasts previously known edible oils against the forces of rancidity. As an intentional ingredient of shortening and table spreads, it makes their consistency almost independent of temperature. (As man inhabits more and more of the globe, he will need quite a few such ideas to keep himself in a good frame of mind.)

To send for our salesman and his samples, write Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company.) Let him hint at new frontiers in fish-dipping, raisin-spraying, chicken-plucking, meat-freezing, and sealing the cut end of a hand of bananas so that the stalk can be left back at the plantation.

*A distilled monoglyceride of fully hydrogenated lard or cottonseed oil, with about half the glyceryl hydroxyls replaced by acetyl groups.

**A distilled monoglyceride of partially hydrogenated lard or cottonseed oil, with nearly all the glyceryl hydroxyls replaced by acetyl groups.

***United States Food and Drug Regulations, Sec. 121.1018.

Kodak
TRADE MARK

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

the Physical and Biological Sciences, intern. symp., Vienna, Austria. (Office of Special Projects, U.S. Atomic Energy Commission, Washington 25, D.C.)

10–15. Federation of American Societies for Experimental Biology, 45th annual, Atlantic City, N.J. (M. O. Lee, 9650 Wisconsin Ave., Washington 14, D.C.)

10–15. Metallic Corrosion, 1st intern. cong., London, England. (Society of Chemical Industry, 14 Belgrave Sq., London, S.W.1)

11–13. Institute of Environmental Sciences, annual, Chicago, Ill. (H. Sanders, Box 191, Mt. Prospect, Ill.)

11–13. Ultrapurification of Semiconductor Materials, conf., A.F. Office of Scientific Research, Boston, Mass. (Miss H. Turin, Conf. Secretary, Electronics Research Directorate, Air Force Cambridge Research Lab., L. G. Hansom Field, Bedford, Mass.)

12–13. Information and Decision Processes, 3rd symp., Lafayette, Ind. (R. E. Machol, School of Electrical Engineering, Purdue Univ., Lafayette)

12–14. Agglomeration, intern. symp., Philadelphia, Pa. (Metallurgical Soc. of the AIME, 29 W. 39 St., New York 18)

12–14. Chemical Soc., anniversary meeting, Liverpool, England. (Chemical Society, Burlington House, Piccadilly, London, W.1)

13–14. Society of Technical Writers and Publishers, 8th annual, San Francisco, Calif. (R. B. Meier, Head Editor, Engineering, Stanford Research Inst., 333 Ravenswood Ave., Menlo Park, Calif.)

17–18. Great Lakes Research, 4th conf., Ann Arbor, Mich. (C. F. Powers, Great Lakes Research Division, 1119 Natural Science Bldg., Ann Arbor)

17–19. Fluid Seal Meeting, intern., Ashford, Kent, England. (Information Officer, British Hydromechanics Research Assoc., South Road, Temple Fields, Harlow, Essex)

17–24. International Congress of Nurses, 12th quadrennial cong., Melbourne, Australia. (Miss D. C. Bridges, Secretary, 1 Dean Trench St., London, S.W.1, England)

18–20. Chemical Reactions in the Lower and Upper Atmosphere, intern. symp., San Francisco, Calif. (R. D. Cadle, Stanford Research Inst., Menlo Park, Calif.)

18–21. American Geophysical Union and Amerioan Meteorological Soc., Washington, D.C. (American Geophysical Union, 1515 Massachusetts Ave., NW, Washington 5, D.C.)

19–21. Southwestern Inst. of Radio Engineers Conf. and Electronics Show, Dallas, Tex. (SWIRECO 61, P.O. Box 7443, Dallas 9)

20–21. Society of Chemical Industry, fungicide symp., London, England. (B. J. Heywood, 103 Harrow Drive, Hornchurch, Essex, England)

20–22. Association of Southeastern Biologists, Lexington, Ky. (H. J. Humm, Department of Botany, Duke Univ., Durham, N.C.)

20–24. Microbial Reactions in Marine Environments, intern. symp., Chicago, Ill. (C. H. Oppenheimer, Inst. of Marine Science, Univ. of Texas, Port Arkansas)

21–22. American Assoc. of Univ. Professors, Boston, Mass. (W. P. Fidler, AAUP, 1785 Massachusetts Ave., NW, Washington 6, D.C.)

23. American Pharmaceutical Assoc., Chicago, Ill. (W. S. Apple, 2215 Constitution Ave., NW, Washington, D.C.)

23–26. American Assoc. of Colleges of Pharmacy, Chicago, Ill. (C. W. Bliven, George Washington Univ., Washington 6, D.C.)

23–27. American Ceramic Soc., 63rd annual, Toronto, Canada. (C. S. Pearce, 4055 N. High St., Columbus 14, Ohio)

23–27. Society of American Bacteriologists, Chicago, Ill. (E. M. Foster, 311 Bacteriology, Univ. of Wisconsin, Madison)

23–28. American Soc. of Hospital Pharmacists, Chicago, Ill. (J. A. Oddis, 2215 Constitution Ave., NW, Washington 7, D.C.)

24–26. Aerospace Medical Assoc., 32nd annual, Chicago, Ill. (W. J. Kennard, Secretary-Treasurer, c/o Washington National Airport, Washington, D.C.)

24–27. American Assoc. of Petroleum Geologists, Denver, Colo. (G. V. Cohee, U.S. Geological Survey, Washington 25, D.C.)

24–27. American Physical Soc., Washington, D.C. (K. K. Darrow, 538 W. 120 St., New York 27)

25–28. Society of Economic Paleontologists and Mineralogists, Denver, Colo. (J. Imbrie, Dept. of Geology, Columbia Univ., New York, N.Y.)

(See issue of 17 February for comprehensive list)