

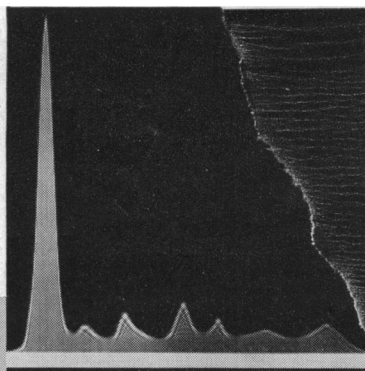
SCIENCE

13 May 1960

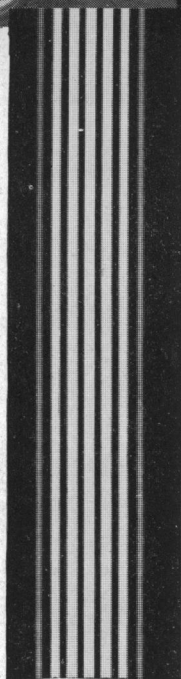
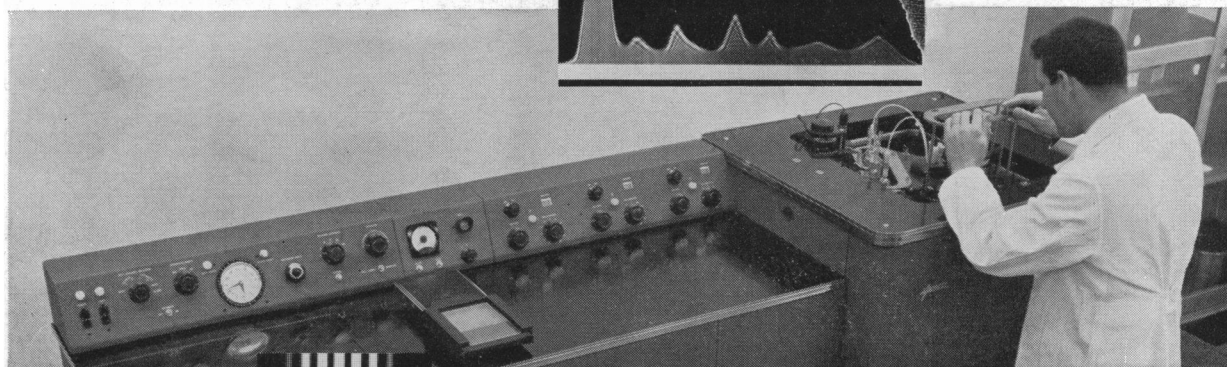
Vol. 131, No. 3411

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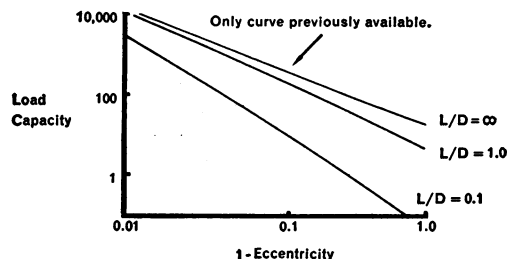
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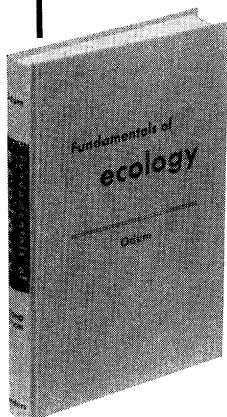
General Motors Research Laboratories
Warren, Michigan

Hydrodynamic analyses have led to specific answers about bearing operation. Shown here are the oil pressure distribution (main illustration) and load-carrying capacity for a non-rotating journal with a reciprocating load.



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Cover	A late Cretaceous ammonite, <i>Placenticerus pseudoplacenta</i> Hyatt, originally described from Utah. Height, about 11 inches. The photograph was taken with a Polaroid-Land camera (type 53, 4 × 5 professional pan Land film). [Gerry Sharpe]	

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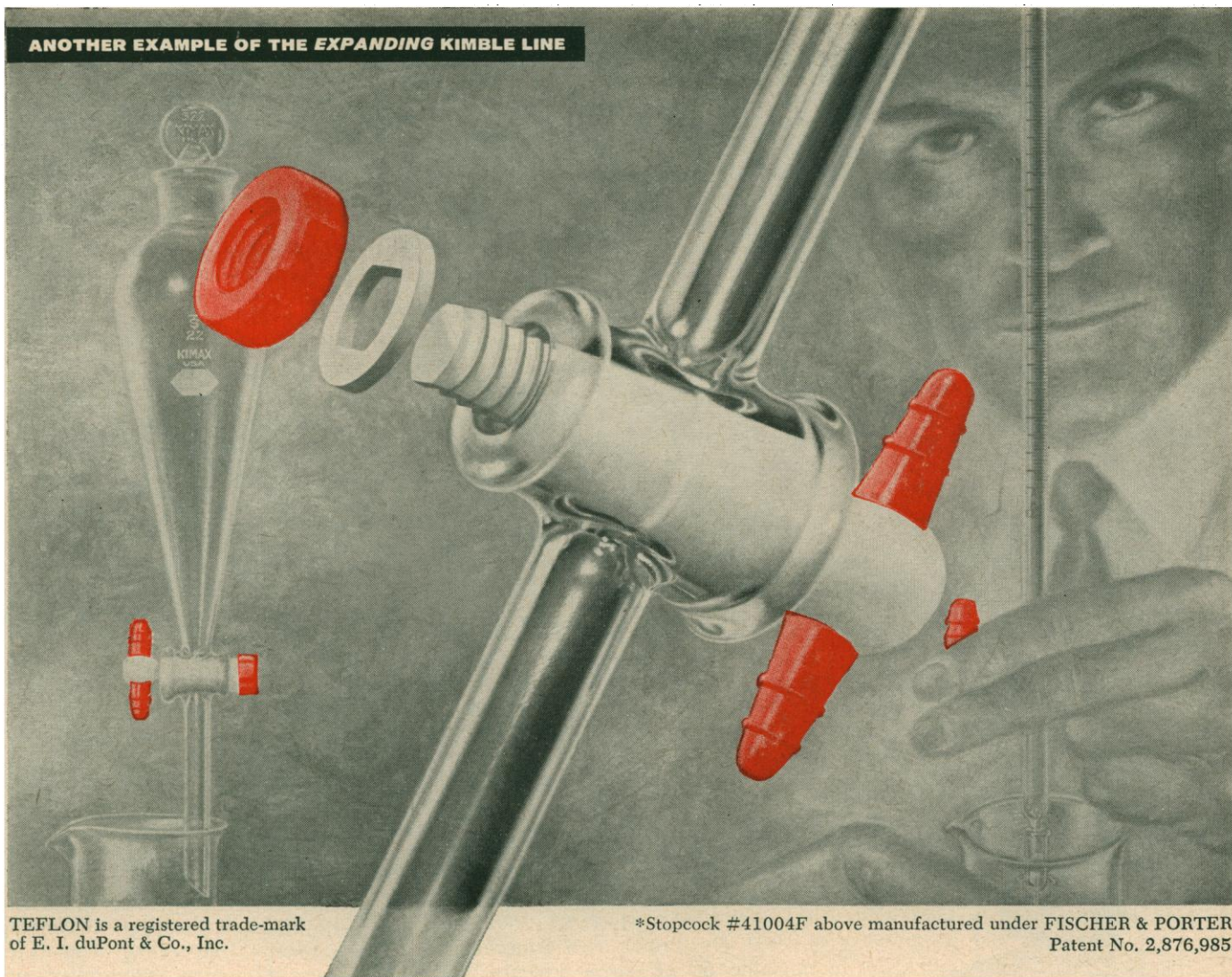
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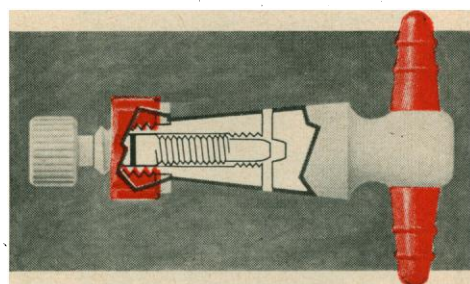
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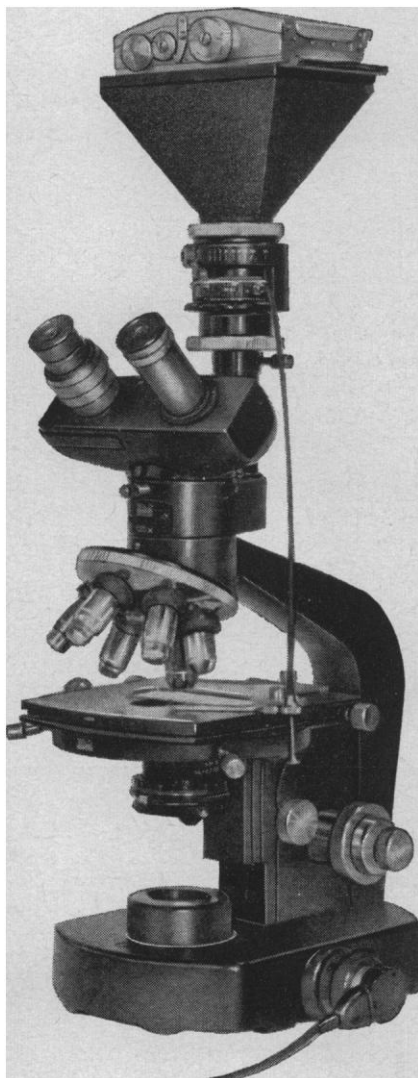
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Letters

Color Phenomena

Recently I reported [*Sci. American* 202, 168 (1960)] that many of the colors described by Land could be obtained binocularly in a procedure that was essentially the same as that of N. Geschwind and J. R. Segal [*Science* 131, 608 (1960)]. Additional unreported results indicate that a "natural image situation" is not necessary for the appearance of colors in a binocular setup. In the attempt to isolate a critical variable and, moreover, to obviate the need for transparencies, I drew two circles in India ink on a white card. The centers were so spaced that when stereoscopic fusion occurred the subject saw two concentric circles. When a red filter (Wratten 25 A) is placed before one eye, the circle stimulating the other eye (no filter) is dark red, and the other circle is green. Changes in the intensity of light can change the green to blue. This result appears to be a case of simultaneous contrast and, of course, is related to colored shadows. The fact that G. L. Walls [*Psychol. Bull.* 57, 29 (1960)] has reinterpreted Land's major results in terms of simultaneous contrast suggests a principle for explaining the colors obtained by me and by Geschwind and Segal.

For an additional point of possible interest I repeated J. L. Brown's procedure [*Science* 131, 155 (1960)] stereoscopically. Brown used a mechanical chopping device for alternately interrupting the two light beams projecting registered images on a screen. Without any filters, Brown reported the usual variety of colors and hues. When I tried this procedure I did not obtain any colors at all.

NICHOLAS PASTORE

Department of Psychology,
Queens College, Flushing, New York

The Term "Cosmoparticle"

A meteorite has been defined as "a solid body of subplanetary mass that either is in space or has come therefrom, is falling or has fallen as a discrete unit onto the Earth or onto some other astronomical body, and still retains its essential cosmic character." Since there seems to be some need now for a term to include all particles of submeteoritic mass, it is proposed that the word *cosmoparticle* be used for this purpose. A cosmoparticle may be defined as "a discrete material entity of submeteoritic mass, either in space or having come therefrom."

Cosmoparticles may be "free" or individual molecules or atoms or molecular or atomic constituents of any kind—ions, atomic nuclei, protons, neutrons, electrons, positrons, and so on. Cosmoparticles and meteorites, as here defined, evidently together comprise all material entities below the category of planet.

FREDERICK C. LEONARD

Department of Astronomy,
University of California, Los Angeles

Stochastic Models

The article on stochastic models of population dynamics by Jerzy Neyman and Elizabeth L. Scott [*Science* 130, 303 (1959)] contains the statement, "with a little luck in attracting the attention of more workers in the field, the process of clustering, with its further theoretical developments, may easily become the basis of a new theory which we like to call indeterministic cosmology." An offer from these particular statisticians to devote their energies to cosmology should not go without comment at a time when more and more observational data will be coming out of this nation's space science program for use in analysis and testing of various models.

The claim by Neyman and Scott that an indeterministic model will solve some problems in cosmology that the deterministic model is incapable of solving goes counter to the feeling of many in the physical sciences who reject any research not aimed at complete understanding, which, to them, means a deterministic model. Any model that is not deterministic is not considered realistic. An explanation in stochastic terms is no explanation at all. Knowledge must be gained with a deterministic model at every step of the way. An unfortunate result of this attitude is that difficulties in a limited area of a given field of research can slow down progress in the entire field until the difficulties are completely resolved in a deterministic manner. This is like not allowing the use of x to represent an unknown quantity, denying the use of algebra, and insisting that all problems must be solved through the more realistic arithmetic methods. Also unfortunate is the fact that frequently there is no meeting of minds in arguments on this point because these implicit assumptions or subconscious convictions do not come to the surface and the controversy centers around secondary concepts that follow from them.

Now let us look at the other side of the problem. Does a stochastic model

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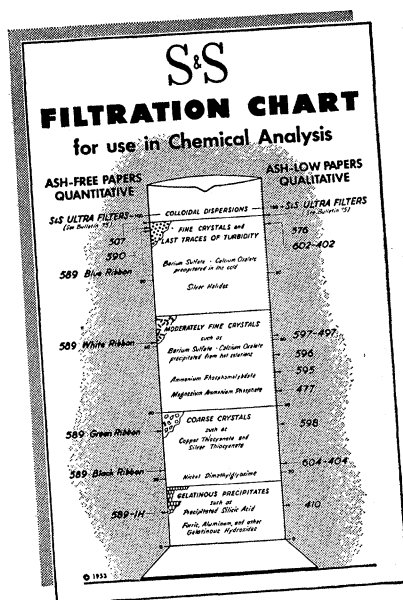
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really solve some problems or is it merely a utilitarian way around them? Neyman and Scott seem to take either view at various times. In some of their writings they admit that their stochastic approach may be at least partly utilitarian. In other places they state that the people who espouse determinism are trying to explain an indeterministic world with a deterministic model and so are doomed to failure. This can alienate some potential friends from the physical sciences. In yet another place Neyman calls such speculation idle. It may be idle technically but it can affect cooperation among scientists from different disciplines. A more accurate way of saying the same thing might be that the utilitarian aspects in the work of Neyman and Scott stand up no matter how we view the basic nature of the universe. The random portion of a stochastic model can be used to describe: (i) a truly random process; (ii) a process that appears random to us; (iii) a process that is too complex to be described completely.

If the world is basically indeterministic, the stochastic model can, of course, be realistic. If the world is basically deterministic, the stochastic model can still be thought of as a utilitarian generalization of a deterministic model. For example, when research reaches an impasse such as the contradiction between the cosmological principle and local irregularities, one can bypass it by the use of a stochastic model. The former impasse becomes an "island of indeterminism" within an otherwise deterministic model. Such a model can never explain in deterministic terms that part of the mechanism which has been assumed to be random. This statement is trivial but it does point up an important divergence in "parlance" between some theoretical statisticians and some physical scientists. To a statistician, any reduction of unexplained variation can be called an explanation. He can happily refer to an explanation of the behavior of aggregates in an "island of indeterminism" while the physical scientist bemoans the fact that the behavior of individuals is unexplainable with such a model.

Perhaps such divergence in views can be reconciled. To a statistician, any particular model is highly expendable. As knowledge increases, one can construct newer models with a decreasing area of indeterminism so that one approaches a deterministic model. The ultimate degree of approach will depend upon the nature of ultimate reality. A scientist can believe whatever he wishes about the ultimate state of affairs and still accept the stochastic model for its utilitarian aspects. This should be comforting to those in the physical sciences who like to feel that they are now

working with reality even though the model they are using has replaced many former models and will itself inevitably be replaced some day.

NICHOLAS E. MANOS

National Aeronautics and Space Administration, Washington, D.C.

Detecting Antibodies to Penicillin

The report by Marguerite Epp [*Science* **130**, 1472 (1959)] that sera from penicillin-allergic subjects agglutinate erythrocytes coupled to penicillin by means of a bis-diazotized-benzidine linkage confirms results of my co-workers and me with the same method plus the use of human antiglobulin (Coomb's) reagent as a final step to "develop" the reaction. As a matter of fact we believe that our procedure, as reported to the first Latin American Congress of Microbiology (Mexico, 12-19 October 1958) and to the National Congress of Allergists (Toluca City, Mexico, May 1958), avoids the necessity of making the "checkerboard" titration that Epp uses.

References to our work appear only in Spanish [reports and abstracts of works presented to the first Latin American Congress of Microbiology (1958); F. Martínez and L. Martín *Prensa méd. Mex.* **24**, 245 (1959); M. Salazar Mallén and L. Ortiz, *Alergia Rev. iberoam. alergol.* **7**, 348 (1959); and the thesis of L. Ortiz, University of Mexico (1959)].

We believe that the description that Epp gives of the method she uses and the information given here will encourage other investigators to take advantage of this first specific in vitro procedure, so useful in our hands, for diagnosing or confirming diagnoses of penicillin allergy.

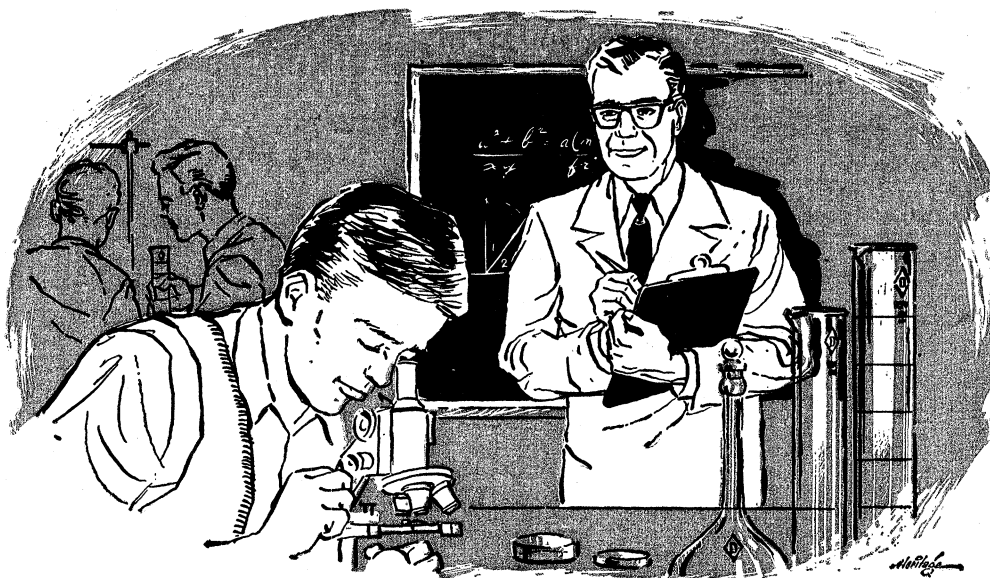
M. SALAZAR MALLÉN

Medellín 94, Mexico City, Mexico

There are several points of importance in M. Salazar Mallén's letter which, I think, should be made clear. I rather question his statement that the "checkerboard" titration to establish the optimal ratio of penicillin to bis-diazotized-benzidine is unnecessary. In practice, there are variations in biological and chemical products. For example, the optimal ratio may vary as follows: from 2.5 to 4.5 mgm of penicillin to from 0.25 to 0.5 ml of the diluted chemical compound. Moreover, the method of Salazar Mallén and his collaborators and that described by me differ in principle. The former detects incomplete antibodies, whereas the procedure described in my report measures complete antibodies.

MARGUERITE EPP

Department of Bacteriology, University of Saskatchewan, Saskatoon



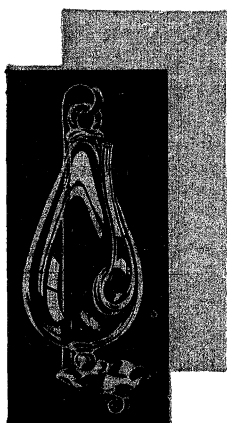
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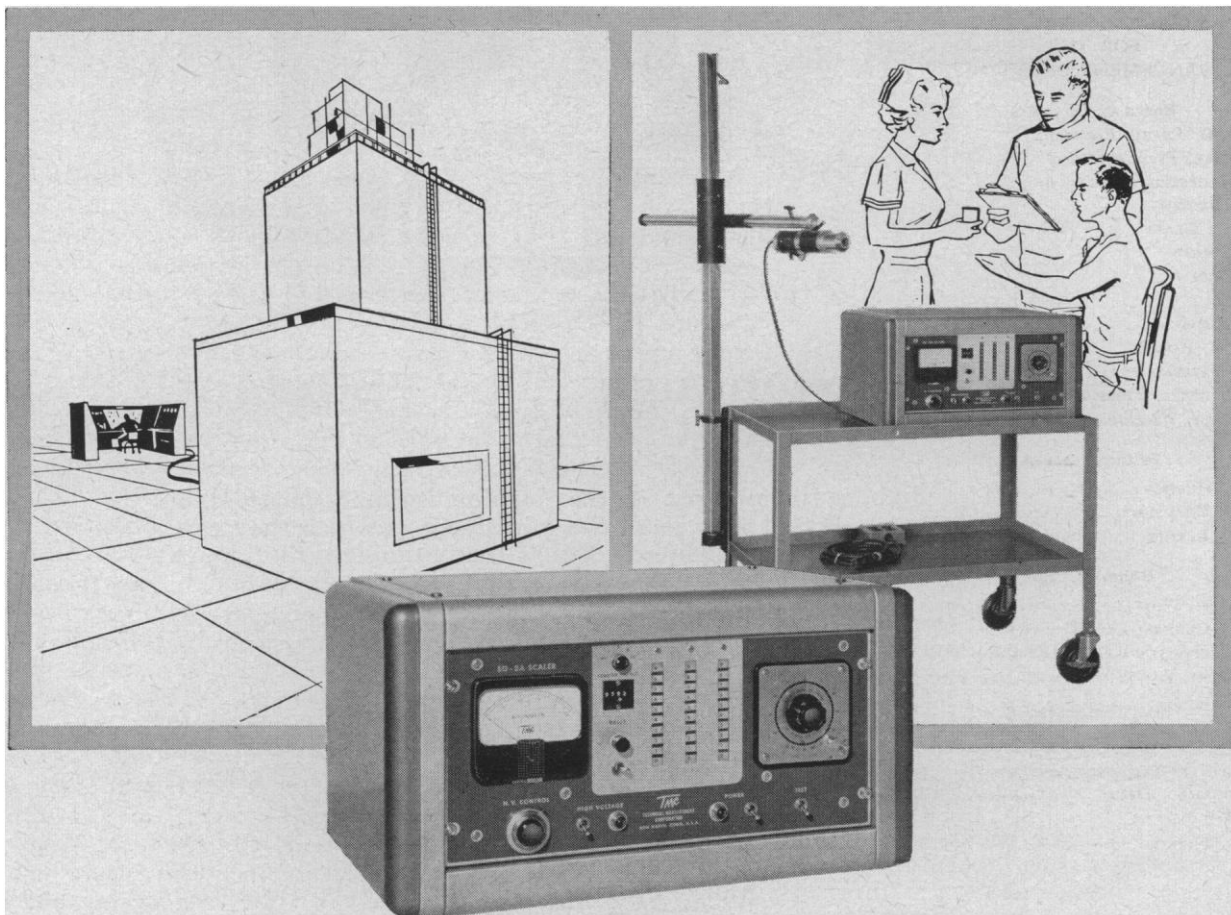
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Teaching "Science Learnings"

A chapter on elementary-school "science learnings," as the author likes to call it, in a recent volume of essays by professors of education contains much with which we agree. The volume is *Modern Methods in Elementary Education* (Henry Holt and Company), edited by Merle M. Ohlsen of the University of Illinois, and the chapter is by J. Myron Atkin, of the same university. It is entirely sensible, as the chapter suggests, to teach the simpler aspects of a subject before broaching the more complex aspects. And we concur that a good science program must have materials for experimentation. But we cannot give the chapter our full endorsement. Atkin, in his enthusiasm to establish that pupils should be taught things that have meaning for them, uses a few expressions whose connotation may lead beginning teachers into unrecommended patterns of pedagogy.

One place where the reader may be led astray is in the discussion of breadth versus depth in "science experiences." The need is cited for youngsters to "have experiences with electricity in the first grade, again in [the] second, more in [the] third." The notion of a continuing program of study is good, but we must caution the reader that by "experiences with electricity" Atkin means only what in more prosaic language we would call "studying electricity"—using well-insulated magnets, buzzers, and the like. He is not suggesting that teachers should administer shocks to their pupils. Admittedly, however, such procedure would make sense in a historical approach to teaching science, for it was just by giving himself shocks and comparing their strength that Cavendish in the 18th century was able to anticipate some of the discoveries of Ohm and Faraday.

The account offered of a hypothetical classroom also requires interpretation. An enlightened teacher is described as listening to his pupils' reports on their recent efforts at testing hypotheses. The children "told of hypotheses they had formulated and tested. Some hypotheses they had tested by simple experimentation. Some they had tested by going to books or adults." Here the beginning teacher should not be awed by the achievements of his pupils as they "test hypotheses." Simple experimentation is simple experimentation, and in going to books and adults the children most likely are doing what we more ordinarily would call "looking things up" and "asking questions." We do grant, however, that by these activities the boys and girls really *could* be testing hypotheses: the hypotheses, for example, that they can read and that grown-ups do not know everything.

A final word of caution concerns the general argument of the chapter; this, as stated by the editor in an introductory note, is that even young children should be taught "to apply the scientific method in solving their everyday academic and personal problems." A timely example of scientific method applied to personal problems, although on a national level, is a theory recently worked out by Senator Muskie of Maine. According to the theory, in the coming presidential election, either Humphrey or Kennedy could beat Nixon, but Rockefeller could beat both Humphrey and Kennedy. The Senator notes that the candidate with the longest name has the best chance of winning: Hoover beat Smith; Roosevelt beat Hoover, Landon, Willkie, and Dewey; Truman beat Dewey; and Eisenhower beat Stevenson. Our final word to beginning teachers, and to the youngsters too, is, do not bet on the election.—J.T.

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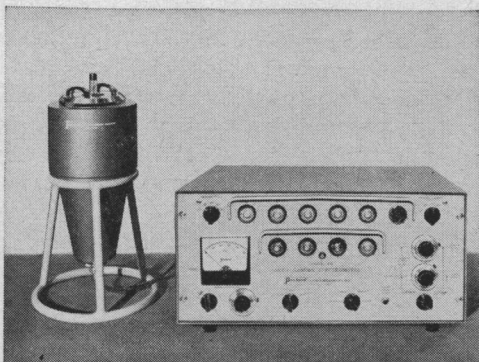
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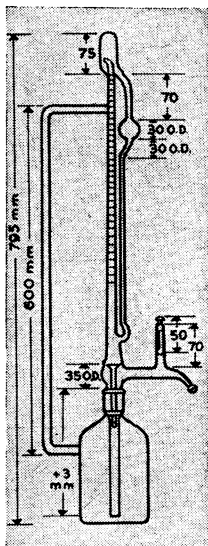
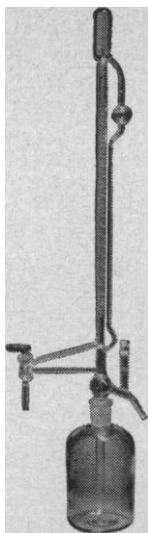
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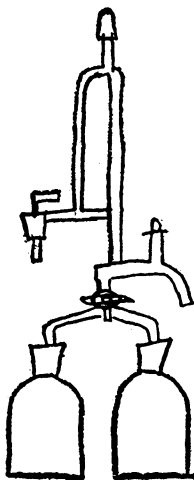


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Meetings

Science in Nigeria

The second annual conference of the Science Association of Nigeria was held in Zaria, Northern Nigeria, 15 to 18 December 1959. This association, affiliated with the wider organization of the West African Science Association, has been in existence only 1 year. Its membership is recruited from all branches of the teaching profession, from government scientists, and from industrial organizations.

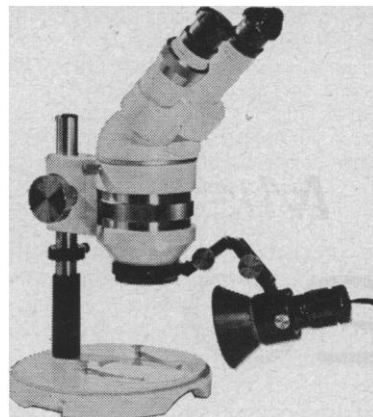
The immense developments in Nigeria since World War II have given rise to a large increase in the numbers of scientific workers, both African and European. Yet the over-all numbers are still grossly inadequate for the country's need in an age of technological expansion. The association was brought into being for the dual purpose of providing a forum for scientists working in the country and of informing the general public of the role which scientific work is playing in their lives. Already the association has achieved considerable success. The quality of the papers and the discussions at the 1959 meeting was extremely high and gave a picture of a general standard of work and achievement which would have been unthinkable not many years ago.

The most obvious immediate technological needs of this country are in agriculture and allied fields. It is not surprising, therefore, that a great deal of emphasis was placed on agricultural developments and on the relation of these developments to nutrition. But other subjects were not neglected. The disturbing question of the biological effects of radiation—a real issue in this country since the first mention of atom-bomb tests in the Sahara—was dealt with in a scholarly and authoritative manner. There were brief incursions into the realms of physiology and even of philosophy.

The importance of the meeting, though, really lay in the fact that it brought together workers from many parts of Nigeria and from many fields of work. Physical and intellectual isolation are an ever-present danger in a vast, underdeveloped territory such as this, and an interchange of ideas and viewpoints is a real necessity.

This meeting underlined a phenomenon of great significance, certainly, in Africa, probably also in other territories—namely, a reorientation in the pattern of research. Before the war the tropics, at best, were field stations visited by scientists from Europe who collected their material for examination in properly equipped laboratories in Europe. Today, Nigeria has not merely

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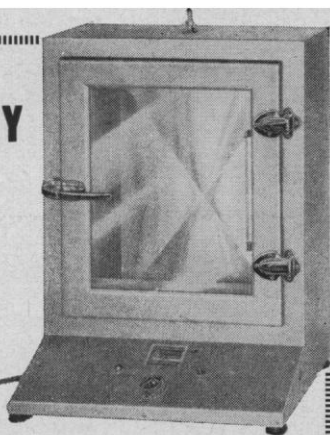
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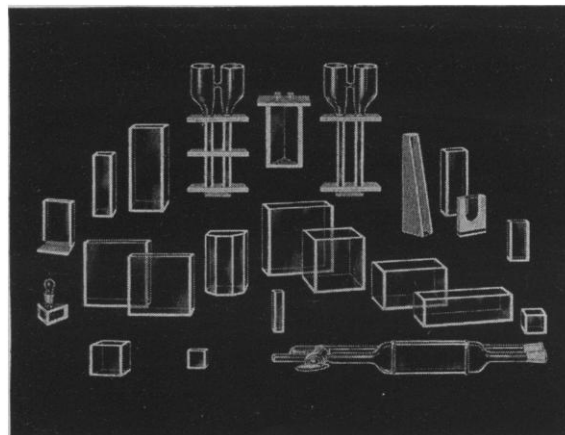
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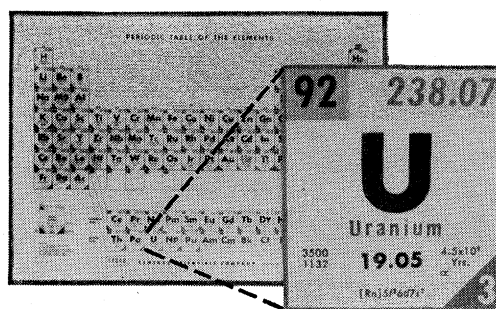
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the laboratories (insufficient in number, perhaps, but still there) but also the scientific personnel to carry out the work. The opportunities here are immense, and the challenge is something which Europe cannot match. There is, after all, a fundamental absurdity (though this was justifiably overlooked at the time they were created) in situating institutions of tropical research in England or indeed anywhere outside the tropics. This change alone is a big development. Most of the original work carried out in this country is, perforce, in applications such as agriculture and medicine. Nevertheless, the third step toward scientific maturity has already been taken, for there is now a great deal of "pure" research going on, particularly at the University College, Ibadan.

Science and technology in Nigeria are still young, but one feels that the plant is viable, that scientific activity will continue to grow, and that the nation as a whole will increasingly come to accept the new technologies as her best guarantee of future prosperity.

These are the impressions gleaned at the conference, at least by one observer. I feel that the Science Association of Nigeria is to be congratulated on the success of its first year of life and, in particular, of its second conference.

BRIAN HOPKINS
University College, Ibadan, Nigeria

Forthcoming Events

June

8-10. Canadian Federation of Biological Societies (Canadian Physiological Soc., Pharmacological Soc. of Canada, Canadian Assoc. of Anatomists, Canadian Biochemical Soc.), 3rd annual, Winnipeg, Manitoba. (E. H. Bensley, Montreal General Hospital, 1650 Cedar Ave., Montreal 25, P.Q.)

8-11. National Soc. of Professional Engineers, annual, Boston, Mass. (P. H. Robbins, NSPE, 2029 K St., NW, Washington 6)

8-12. American College of Chest Physicians, Miami Beach, Fla. (M. Kornfeld, 112 E. Chestnut St., Chicago 11, Ill.)

9-10. American Geriatrics Soc., Miami Beach, Fla. (R. J. Kraemer, 2907 Post Rd., Warwick, R.I.)

9-10. Canadian Inst. of Food Technology, 3rd annual conf., Winnipeg, Manitoba. (W. J. Eva, Box 846, Winnipeg, Manitoba)

9-10. Society of Women Engineers, 10th annual conv., Seattle, Wash. (Mrs. J. A. Troxell, 3613 E. 43 St., Seattle 5)

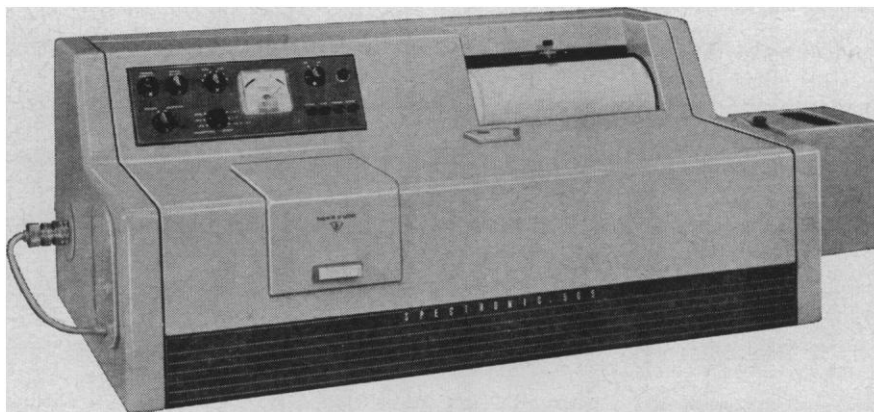
9-11. Acoustical Soc. of America, Providence, R.I. (W. Waterfall, ASA, 335 E. 45 St., New York 17)

9-11. Endocrine Soc., Miami Beach, Fla. (H. H. Turner, 1200 N. Walker, Oklahoma City 3, Okla.)

9-11. National Speleological Soc., annual, Carlsbad, N.M. (G. W. Moore, U.S. Geological Survey, Menlo Park, Calif.)

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