

SCIENCE

27 February 1959

Volume 129, Number 3348

Editorial	Plums for the Teacher	535
Articles	Biological Control of Insect Pests: <i>C. A. Fleschner</i>	537
	Insect pests are economically controlled through the utilization of their natural enemies.	
	Electroluminescence: <i>K. H. Butler</i>	544
	New light sources, having theoretical as well as practical interest, are created by electroluminescence.	
News of Science	American Oceanography Survey and Proposals for Ten-Year Program Made by NAS-NRC Committee; recent events	550
Book Reviews	<i>Project Sherwood</i> and other volumes about nuclear energy for peace, reviewed by <i>D. J. Hughes</i> and <i>J. Chernick</i> ; other reviews	558
Reports	A Successor of Tepexpan Man in the Valley of Mexico: <i>H. de Terra</i>	563
	Antigenicity of Steroid-Protein Conjugates: <i>S. M. Beiser</i> et al.	564
	Vanguard Measurements Give Pear-Shaped Component of Earth's Figure: <i>J. A. O'Keefe, A. Eckels, R. K. Squires</i>	565
	Synchronized Cell Division and DNA Synthesis in a <i>Lactobacillus acidophilus</i> Mutant: <i>V. W. Burns</i>	566
	Cholecystokinin Activity of Urine: <i>A. Svatos</i>	567
	Metabolic Dissociation of Short-Lived Barium-137m from Its Cesium-137 Parent: <i>R. H. Wasserman, A. R. Twardock, C. L. Comar</i>	568
	Effects of Thyroxin on Amino Acid Incorporation into Protein: <i>L. Sokoloff</i> and <i>S. Kaufman</i>	569
	Serial Errors in Human Learning: a Test of the McCrary-Hunter Hypothesis: <i>C. E. Noble</i> and <i>J. E. Fuchs</i>	570
	Efficient Method for Selection of Auxotrophic Mutants of <i>Neurospora</i> : <i>H. E. Lester</i> and <i>S. R. Gross</i>	572
Departments	Letters	532
	Social Sciences; Forthcoming Events; Equipment	576

**PROVEN ANSWER
TO TOUGH SEPARATION
PROBLEMS**

*Beckman/Spinco CP
Curtain Electrophoresis*

Results from research laboratories prove you can make even the most difficult separations with the Continuous-Flow Model CP.

More than 200 CP instruments are now being used for such varied and significant separations as

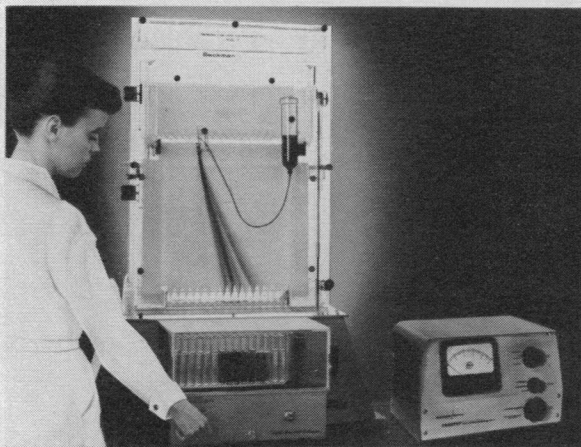
unknown antibiotics from a mixture; electrophoretically pure globulins; radioactive cystine; enzymes in connection with heart and cancer research; tryptic digests of papain; purification of catalase and various plant materials; amino acids; mucosal proteins; further fractionation of alpha-2 globulins; proteins of vitreous humor; serum proteins; hydrolysates.

These are actual—not theoretical—applications from the laboratories of CP users.

With Spinco's experience in continuous flow curtain electrophoresis, you would expect something new. And there is. Not a new CP, but one with major design modifications which makes it a far more serviceable, versatile instrument.

If you face the problem of preparing pure fractions in volume, investigate the improved CP now.

Please write to Spinco Division, Beckman Instruments, Inc., Stanford Industrial Park, Palo Alto, California. Ask for folder CP 5.



Beckman® / Spinco Division

Beckman Instruments, Inc.



Sir James Jeans ... on the quest for knowledge

"Yet we may reflect that physics and philosophy are at most a few thousand years old, but probably have lives of thousands of millions of years stretching away in front of them. They are only just beginning to get under way, and we are still, in Newton's words, like children playing with pebbles on the sea-shore, while the great ocean of truth rolls, unexplored, beyond our reach. It can hardly

be a matter for surprise that our race has not succeeded in solving any large part of its most difficult problems in the first millionth part of its existence. Perhaps life would be a duller affair if it had, for to many it is not knowledge but the quest for knowledge that gives the greater interest to thought — to travel hopefully is better than to arrive."

—*Physics and Philosophy*, 1942

THE RAND CORPORATION, SANTA MONICA, CALIFORNIA

A nonprofit organization engaged in research on problems related to national security and the public interest

SCIENCE is published weekly by the AAAS, 1515 Massachusetts Ave., N.W., Washington 5, D.C. Entered at the Lancaster, Pa., Post Office as second class matter under the act of 3 March 1879. Annual subscriptions: \$8.50; foreign postage, \$1.50; Canadian postage, 75¢.



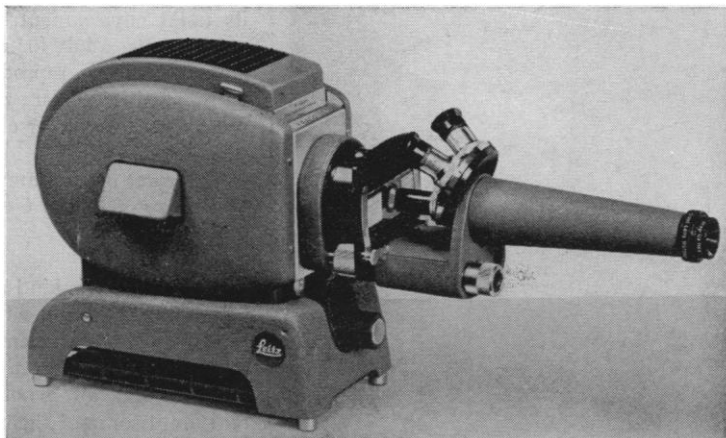
first in precision optics

PRADO MICROPROJECTOR

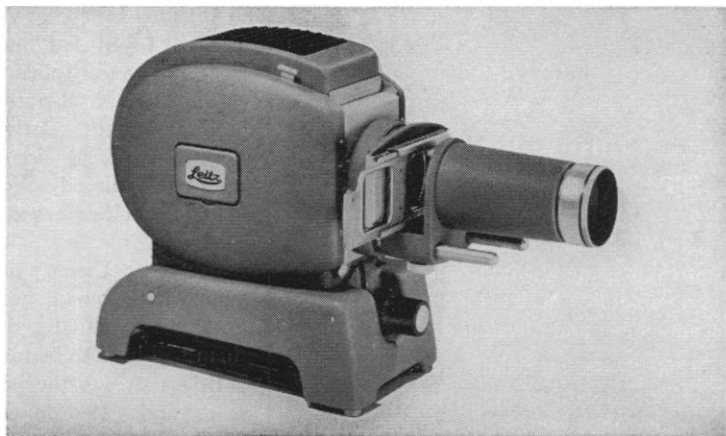
The extreme brilliance, clarity and definition in screen images from the well-known PRADO make it readily convertible from standard 2"x2" (Model 500) or 2¾"x2¾" (Model 66) slide projector to microprojector.

This portable unit may be carried easily from room to room and used wherever there is an electrical outlet. Light from the 500-watt lamp, projected through aspheric condensers in the blower-cooled PRADO, gives an image quality ideal for use in classroom or conference room.

For microprojection, the special micro-attachment simply slides onto the power-condenser housing. The attachment provides an object stage and adjustable condenser lens with helical focusing. A similar attachment is available which allows the stage to be placed in a horizontal position to accommodate wet mounts. The revolving nosepiece holds three objectives: 3.5x, 10x, and 25x. The high power objective is equipped with a spring-loaded mount.



PRADO, as microprojector



PRADO, as standard slide projector

20257

A reputation for integrity and a tradition of service have led thousands of scientific workers to bring their optical problems to Leitz. If you have problems in this field, why not let us help you with them?

See your Leitz dealer and examine these Leitz instruments soon. Write for information.

E. LEITZ, INC., Dept. SC-2
468 Fourth Avenue, New York 16, N. Y.

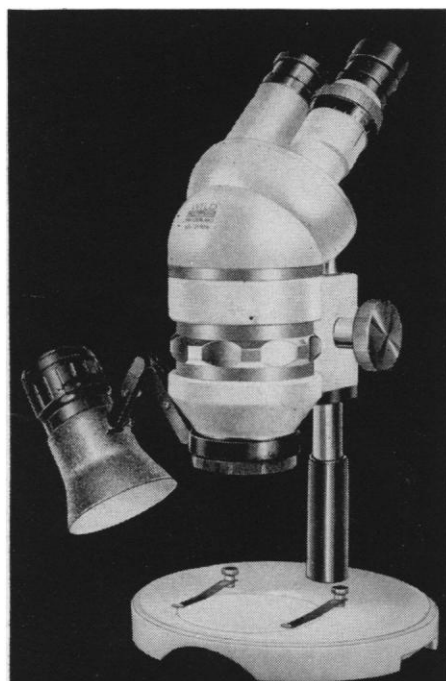
Please send me the Leitz _____ brochure.

NAME _____

STREET _____

CITY _____ ZONE _____ STATE _____

E. LEITZ, INC., 468 FOURTH AVENUE, NEW YORK 16, N. Y.
Distributors of the world-famous products of
Ernst Leitz G. m. b. H., Wetzlar Germany — Ernst Leitz Canada Ltd.
LEICA CAMERAS • LENSES • MICROSCOPES • BINOCULARS



A new achievement for STEREOMICROSCOPY

The WILD* M5 STEREOMICROSCOPE presents, new, important advances in versatility, optics, mechanical conveniences and physical design.

This Swiss precision instrument is equipped with a main objective component followed by pairs of vertically mounted intermediate lenses with parallel axes. The result is increased, uniform sharpness throughout the field, with no need for any change in accommodation.

With a constant working distance of 96 mm., standard magnifications are 6X, 12X, 25X and 50X, conveniently selected on a horizontal drum.

Accessories include a base for transmitted light observation, various light sources, photographic and measuring attachments. A matching steel hood is provided for easy storage and portability.

For full details about this years-ahead stereomicroscope, write for Booklet M5.

*The FIRST name in Surveying Instruments, Photogrammetric Equipment and Microscopes

WILD
HEERBRUGG

Full Factory
Services

INSTRUMENTS, INC.

Main at Covert Street • Port Washington, New York
Port Washington 7-4843

In Canada

Wild of Canada Ltd., 157 MacLaren St., Ottawa, Ontario

offer a conclusion more in line with the evidence presented: Certain species of anadromous and catadromous fishes and probably many amphibians have a most interesting life cycle which includes two types of metamorphic change. The first is a preparation for the animal to leave its natal environment, and the second prepares the adult for re-entry into this environment for reproductive purposes. In some of its aspects, this second metamorphosis is the reverse of the first.

JOHN C. BRIGGS

Department of Anatomy,
University of British Columbia,
Vancouver

Briggs' letter is kind and generous, up to the peroration, in which it characterizes one of my statements as "sweeping." I hardly know what this means; but I suppose that all generalizations sound odd, until some of them, through reiteration, become familiar; and I have tried to keep my sweepings visible.

When I said that "metamorphosis is a basic and general phenomenon, common to the whole vertebrate stock," I meant in part that the relatively few observations of the kind discussed which have been made, already offer examples ranging from cyclostomes to mammals. In all justice, I meant to imply something more: that these phenomena already appear to be so widespread that whatever lines are eventually drawn to delimit them will have to be rather arbitrary.

Briggs stresses the point that anadromous and catadromous fishes include "probably less than 1 percent of the known species." This percentage is irrelevant; also, the phenomenon is not so limited. Beyond such extreme examples as cited in my paper, one encounters in fishes all degrees of the anadromous and catadromous condition. A. Meek says in his valuable book [*The Migrations of Fish* (Arnold, London, 1916), p. 18]: "Fish which leave the sea to spawn in estuaries only differ in degree from those which spawn just beyond brackish water, and there are fish which may spawn on the coast or in brackish water. So that it may be said all degrees of anadromous migration from mid-ocean to the upper limits of streams may take place and corresponding catadromous migrations. . . ."

Apart, however, from this range of life histories, it is generally agreed that the vast majority of contemporary fishes have migrated, perhaps repeatedly, between fresh waters and the sea during their evolution. A. S. Romer [*Man and the Vertebrates* (Penguin Books, Harmondsworth, Middlesex, 1954), vol. 1, pp. 39-40], for example, thinks that though the fishes as a class arose in fresh water, virtually all teleosts now found in

fresh water have probably re-entered that environment from the sea: "The primitive teleosts, as we have suggested, evolved in the sea, and the vast majority of the group still live in salt water. They have, however, returned in considerable numbers to the fresh waters *which were the homes of their ancestors . . .*" (italics mine). It is probably true, therefore, that the great majority of what are now stenohaline fishes have had euryhaline forms in their ancestry, and so might exhibit metamorphic changes associated not only with their own migrations, but recapitulating those of their ancestors.

As for traces of biochemical metamorphosis in stenohaline fishes, Clyde Manwell has recently reported finding distinct embryonic hemoglobins in the spiny dogfish *Squalus suckleyi*, the skate *Raja binoculata*, and the marine teleosts, the sculpin *Scorpaenichthys marmoratus*, and the live-bearing surf-perch *Embiotoca lateralis* [*Physiol. Zool.* 31, 93 (1958); *Science* 128, 419 (1958); *ibid.* 126, 1175 (1957)].

Altogether, therefore, Briggs comes perilously close to a sweeping statement in saying that "The vast majority of fishes remain in essentially the same environment into which they are born, having no need for, and showing no evidence of, metamorphic change to prepare the adult for entry into a special natal environment."

Finally, Briggs takes issue with my suggestion that the land vertebrates have not left either metamorphosis or problems of migration wholly behind. I speak of "residues of metamorphosis" and "vestiges of a second metamorphosis," and say with regard to the latter: "I suppose that puberty is so to be regarded. To be sure, this does not prepare a land vertebrate to migrate, for the natal environment is now segregated, and puberty prepares the animal only to mate." I had said earlier that land vertebrates "have developed two special devices" for pursuing ashore their embryogeny in water: "the boxed-in or cleidoic egg, and viviparity." Are these thoughts different from Briggs' remarks about the development of the amniote egg? And though it may be true that the natal environment of a land vertebrate "almost always" refers to the amniotic fluid, I hope the context of my discussion made it clear that I had included (see Fig. 18 of my article) the environment also of the egg, before and after fertilization.

I think that if Briggs will pursue the phenomena themselves, apart from conventional ways of talking about them, he will find, as I have, that it is difficult indeed to know where to stop.

GEORGE WALD

Biological Laboratories of
Harvard University, Cambridge, Mass.

**WHEN
THREE EYES ARE
BETTER
THAN
TWO**

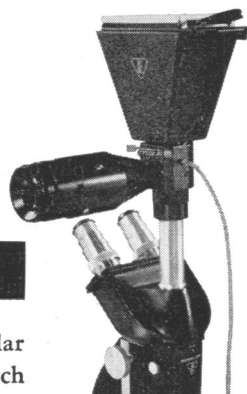
**New
TRIOCLAR
MODEL**

BAUSCH & LOMB

Dynoptic

LABORATORY MICROSCOPES

(Complete Triocular Microscope, or interchangeable Triocular body, available in B&L Dynoptic Laboratory and Research Microscope models.)



IN PHOTOMICROGRAPHY,

for example, when the third eye is that of the camera, the new B&L Triocular Microscope quickly gives visual and photographic results in sharp detail and vivid contrast. Combines comfortable binocular vision with a photographic tube; you scan, orient and focus in the usual way. To take a picture, just glance at the Camera Viewer for touch-up focus and CLICK! That's all there is to it! You photograph what you see—and you see today's brightest images.

IN CONSULTATION,

the B&L Triocular lets you and a colleague study the same subject, through the same microscope, at the same time. And you can get ample light for simultaneous viewing of normally hard-to-see images: phase contrast, dark-field, deeply stained specimens. You've got everything you need, right on the spot, for daily, practical applications ranging from instruction to research collaboration.



SEE FOR YOURSELF, IN YOUR OWN LAB • MAIL COUPON NOW

**BAUSCH & LOMB OPTICAL CO.
75938 St. Paul Street, Rochester 2, N. Y.**

- ☐ Send me B&L Dynoptic Triocular Microscope Catalog D1084.
- ☐ Schedule a demonstration, in my lab, at my convenience.

Name, Title.....

Professional address.....

.....

.....

.....

The world's widest range of Radiochemicals comes from Amersham



Process Buildings
at Amersham



Each year at the Radiochemical Centre we prepare over five hundred labelled compounds incorporating some twenty different isotopes. Of carbon-14 alone over two hundred compounds are available, mostly from stock. Our range covers all the important tracer isotopes—S-35, P-32, I-131, T-3, Cl-36, etc.

We cater for many interests—for biologists with labelled steroids, sugars, amino acids, carcinogens, vitamin B12, etc.—for industrial chemists with labelled weedkillers, pesticides, fertilisers, detergents.

To all tracer users we are pleased to offer advice—and often to make special labelled materials for their use. Write to Amersham for our general lists or tell us about your particular problem.



THE RADIOCHEMICAL CENTRE
AMERSHAM, BUCKINGHAMSHIRE, ENGLAND

ANNOUNCING THE ONLY EXPLOSION-PROOF BLENDOR



New WARING LABORATORY BLENDOR BASE for use in HAZARDOUS LOCATIONS

Wherever hazardous lab atmospheres exist, you can safely blend materials at high speed—even on your toughest research and development projects. This new Waring Laboratory Blendor provides the protection of a 1/5 hp explosion-proof GE motor which carries a Class 1—Group D rating. Two speed explosion-proof switch also available.

The Waring explosion-proof base (Model EP-1) accommodates the standard 37½ oz. Pyrex container. Same capacity stainless steel container Model SS-510 (pictured) comes with lid and stainless steel cutting assembly; meets every requirement of the severest lab service.

Blend fast . . . blend thoroughly . . . blend *safely*. When you invest in a Waring Explosion-Proof Blendor Base, you can be sure you have the ultimate in the elimination of laboratory fire hazards.

WARING PRODUCTS CORPORATION

25 West 43rd St., New York 36, N. Y.

Subsidiary of Dynamics Corporation of America



—SEND FOR FREE LITERATURE—

GENTLEMEN:

I want full specification data on the new Explosion-Proof Waring Laboratory Blendor Base.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY/ZONE _____ STATE _____

Do you know . . .

What's the distance modulus?

And the escape velocity from Saturn?

And the red shift?

And the solar carbon cycle?

And a Cepheid variable?

And—

You can find over 2,200 vital facts fast with the new—

Dictionary of Astronomy and Astronautics

by ARMAND N. SPITZ

Coordinator of Visual Satellite Observations for the Smithsonian Astrophysical Observatory, Cambridge, Mass.

Arranged in handy dictionary form and supplemented by numerous graphs and illustrations, here are concise definitions of every important term and concept relating to astronomy and astronautics. \$6.00

Philosophical Library, Publishers
15 East 40 Street, New York 16

IS YOUR GUESS WORTH \$100?

ENTER CONTEST TODAY

see our ad
on page 520
of the
february 20th
issue . . . or
write for
details

•
•
•
•
•
•

**NUCLEAR
ELECTRONICS**
CORPORATION

2925 N. BROAD ST., PHILADELPHIA 32, PA. • BALDWIN 6-2300
Export Representatives: AD. AURIEMA, INC., New York

P. S. See us at the Atom Fair, April 6-10
Cleveland Public Auditorium
Booth #701

Meetings

Social Sciences

The newly formed Associazione Italiana di Scienze Sociali, in conjunction with the Centro Nazionale di Prevenzione e Difesa Sociale, held the First National Congress of Social Sciences at the Palazzo Serbelloni-Cabiati in Milan, 31 May to 2 June 1958.

The association was formed about a year ago in response to a felt need for an organization that would facilitate contact among all those who, in various scientific disciplines, concern themselves with the study of society, with special regard to contemporary Italian society and culture.

The congress was divided into two distinct parts. The first (theoretical), on the integration of the social sciences, considered the premises of the various social sciences and the problem of their interdependence; the second (applied), on city and farm areas, dealt with the specific problem of the relation between urban and rural populations, and with research already completed.

The actual proceedings consisted of a presentation of short summaries of papers that had been printed and gathered in a large volume in time for distribution at the congress. Following these summaries, the discussion was opened and took the greater part of the time. This made it possible both to study a paper carefully and to have sufficient time to make a substantial contribution to the discussion.

Speakers and discussants in the first part of the program addressed themselves to the problem of definition and interdependence of the various social sciences and the connection between these and philosophy. Much interest was shown in breaking out of the traditional academic boundaries, and a genuine effort was made to search for a fruitful approach. The debate raged, as was to be expected, around whether "complementarity" or "integration" (fusion) of the disciplines would yield best results. Also discussed at length were the relations of the social sciences to ethics and to philosophy. One of the speakers pointed out that "it seems no longer true that philosophy tells the social sciences what should be done."

The proceedings of the congress, and papers that were late, will shortly be published in a second volume.

The congress was attended by a large number of people, from Italy and other countries, prominent in such fields as sociology, social anthropology, social psychology, economics, jurisprudence, social medicine, and philosophy.

The president of the association is Renato Treves of the University of Milan. Tullio Tentori, professor at the University of Rome and director of the Museo delle Arti e Tradizioni Popolari of Rome, is national secretary.

RENATO TAGIURI

Graduate School of Business
Administration, Harvard University,
Boston, Massachusetts

Forthcoming Events

March

24. Admissions Policies to Serve the Needs of the Community, symp., Cleveland, Ohio. (B. G. Fricke, Univ. of Michigan, 120 Rackham Bldg., Ann Arbor.)

27-28. Michigan Acad. of Sciences, East Lansing. (D. A. Rings, Univ. of Michigan, Dept. of Engineering, Ann Arbor.)

27-28. Pennsylvania Acad. of Sciences, Gettysburg. (K. Dearolf, Public Museum and Art Gallery, Reading, Pa.)

28. South Carolina Acad. of Sciences, Columbia. (H. W. Freeman, Dept. of Biology, Winthrop College, Rock Hill, S.C.)

29-3. Association for Childhood Education International, 1959 study conf., St. Louis, Mo. (ACEI, 1200 15 St., NW, Washington 5.)

29-31. Latin American Congress of Chemistry, 7th, Mexico D.F., Mexico. (R. I. Frisbie, Calle Ciprés No. 176, Zone 4, Mexico, D.F.)

30-31. Third Teratology Conf., Portland, Ore. (D. L. Gunberg, Dept. of Anatomy, Univ. of Oregon Medical School, Portland.)

30-1. American Orthopsychiatric Assoc., San Francisco, Calif. (M. F. Langer, 1790 Broadway, New York 19.)

30-12. Bahamas Medical Conf., 7th, Nassau. (B. L. Frank, 1290 Pine Ave., W. Montreal, Canada.)

31-2. American Power Conf., 21st annual, Chicago, Ill. (N. S. Hibshman, AIEE, 33 W. 39 St., New York 18.)

31-2. Symposium on Millimeter Waves, 9th, New York, N.Y. (H. J. Carlin, Microwave Research Inst., 55 Johnson St., Brooklyn 1, N.Y.)

31-4. National Science Teachers Assoc., 7th natl. conv., Atlantic City, N.J. (R. H. Carlton, NSTA, 1201 16 St., NW, Washington 6.)

31-5. International Committee of Military Medicine and Pharmacy, 21st session, Paris, France. (Comité International de Médecine et de Pharmacie Militaires, Hôpital Militaire, 79, rue Saint Laurent, Liège, Belgium.)

April

1-3. American Assoc. of Anatomists, Seattle, Wash. (B. Flexner, Univ. of Pennsylvania Medical School, Philadelphia 4.)

1-4. National Council of Teachers of Mathematics, Dallas, Tex. (H. T. Karnes, Dept. of Mathematics, Louisiana State Univ., Baton Rouge 3.)

1-4. National Speleological Soc., 16th annual conv., Springfield, Mo. (O. Hawksley, Route 5, Warrensburg, Mo.)