

THE LEITZ WORKS ARE THE LARGEST MICROSCOPE MANUFACTURERS IN THE WORLD

# LEITZ

EST'D: 1849

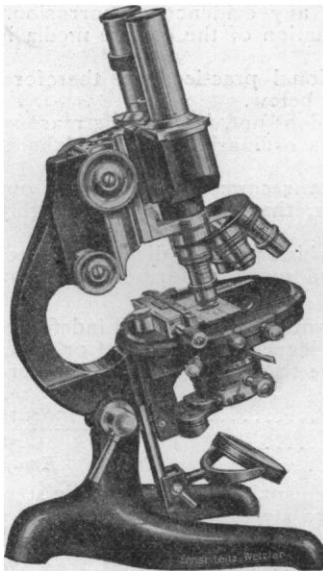
THE STANDARD OF OPTICAL AND MECHANICAL PRECISION

**BINOCULAR MICROSCOPES**

for

## HIGH POWER

In Stock for Immediate Delivery



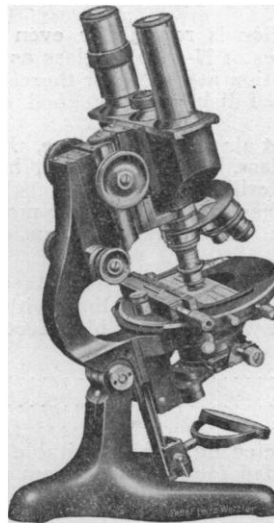
**Model "ABM"**  
including both binocular and  
monocular tubes.

**ABM-10**, including achromatic objectives, in case ..... **\$291.00**

**ABM-20**, including fluorite objectives, in case ..... **\$314.00**

**ABM-30**, including apochromatic objectives, in case ..... **\$398.00**

**22611**, Rotary Mechanical stage for same ..... **\$44.00**



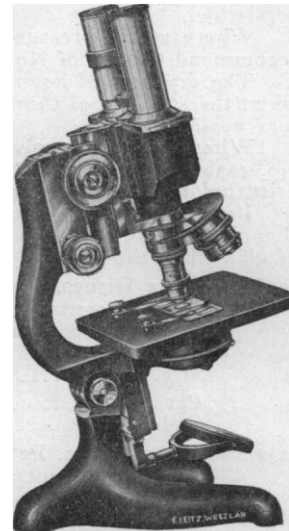
**Model "CBIN"**  
including binocular tube **only**.

**CBIN-10**, including achromatic objectives, in case ..... **\$255.00**

**CBIN-20**, including fluorite objectives, in case ..... **\$278.00**

**CBIN-30**, including apochromatic objectives, in case ..... **\$364.00**

**Monocular Tube** for same . **\$12.00**  
**22614**, Mechanical stage for same. **\$37.50**



**Model "LBM"**  
including binocular tube **only**.

**LBM-10**, including achromatic objectives, in case ..... **\$190.00**

**LBM-20**, including fluorite objectives, in case ..... **\$213.00**

**Monocular Tube** for same . **\$12.00**

**22622**, Mechanical stage for same. **\$30.00**

Write for Pamphlet (O) 1065.

## E. LEITZ, Inc.

60 East 10th Street

New York, N. Y.

AGENTS:

Pacific Coast States: **SPINDLER & SAUPPE**,  
Offices at San Francisco and Los Angeles, Calif.

Canada: **THE J. F. HARTZ CO., Ltd.**, Toronto 2, Can.  
Philippine Is.: **BOTICA DE SANTA CRUZ**, Manila.  
Cuba: **ANTIGA & CO.**, Havana, Cuba.

# PETRI CULTURE DISHES

FOR BOTH HOT AIR AND STEAM PRESSURE STERILIZATION



No. 4326

Petri dishes of the best glass hitherto used for their manufacture frequently corrode<sup>1</sup> or give some evidence of decomposition when subjected to steam pressure sterilization at the usual temperature of 120° C (15 lbs.).<sup>2</sup>

No. 4326 Dishes are of a resistance glass (designated as N-101-AF) which will withstand indefinite<sup>3</sup> steam pressure sterilization at 130° C (24 lbs.) without any evidence of corrosion.<sup>4</sup> Since this glass is relatively alkali-free,<sup>5</sup> the effect on the true reaction of the culture media is negligible.

Where steam pressure sterilization is routine or even occasional practice, we, therefore, recommend the use of No. 4326 dishes of N-101-AF glass as listed below.

The dry heat of hot air sterilization at 170° C or thereabouts does not, for obvious reasons, affect the stability of thoroughly dried dishes of any good glass as ordinarily used for laboratory vessels.

Where practice involves only hot air sterilization, we, therefore, recommend the use of our No. 4330 Dishes of selected lime glass. It is important, however, that dishes be thoroughly dried before placing in the hot air sterilizer.

Both No. 4326 and No. 4330 Dishes are made in new moulds which produce dishes of better shape and finish and with more exact adherence to dimensions and more uniform distribution of glass than those usually sold.

**4326. Culture Dishes, Petri, of resistance (N-101-AF) glass, guaranteed to withstand indefinite<sup>3</sup> steam pressure sterilization at 130° C (24 lbs.) without evidence of corrosion<sup>4</sup> or other signs of decomposition, and with a negligible effect on the true reaction of the culture media.**

Size, mm .....	100 x 10	100 x 15
Per pair .....	.50	.50
Code Word .....	<i>Emoit</i>	<i>Emojr</i>

**4330. Culture Dishes, Petri, of selected lime glass, suitable for the usual routine of hot air sterilization but not recommended for repeated steam pressure sterilization.**

Size, mm .....	100 x 10	100 x 15
Per pair .....	.24	.24
Code Word .....	<i>Emoed</i>	<i>Emohv</i>

## Quantity Discounts on above Petri Dishes

10% discount in carton containing 1 dozen	25% discount in lots of 10 gross
20% discount in case containing 1 gross	30% discount in lots of 50 gross

Prices subject to change without notice

<sup>1</sup> The best dishes have withstood from five to ten steam pressure sterilizations at the usual temperature of 120° C (15 lbs.), but most dishes begin to corrode on the first sterilization at this pressure.

<sup>2</sup> While 120° C is the theoretical equivalent of 15 lbs. pressure, actual operation at this pressure seldom results in a temperature in excess of 110° C.

<sup>3</sup> Our tests have extended to from fifty to sixty successive sterilizations at 130° C (24 lbs.). As in operation at lower temperatures, the theoretical equivalent of 24 lbs. pressure, i.e., 130° C, is maintained with difficulty for any length of time.

<sup>4</sup> A test that is much more severe than is indicated by the difference of ten degrees in temperature.

<sup>5</sup> Shows no trace of pink color after application of a few drops of Phenolsulphonaphthalein or after further application of CO<sub>2</sub> free distilled water.

## ARTHUR H. THOMAS COMPANY

RETAIL—WHOLESALE—EXPORT

### LABORATORY APPARATUS AND REAGENTS

WEST WASHINGTON SQUARE

Cable Address, BALANCE, Philadelphia

PHILADELPHIA, U. S. A.

# SCIENCE

VOL. LXVI NOVEMBER 11, 1927 No. 1715

## CONTENTS

<i>Specialization and Cooperation in Scientific Research:</i>	
PROFESSOR KARL T. COMPTON .....	435
<i>Some Problems in Botanical Classification:</i> G. P. VAN ESELTINE .....	
	442
<i>Scientific Events:</i>	
<i>The International Congress of Entomology; The Walter Rathbone Bacon Scholarship; The Lanthicum Foundation Prize; The Engineering Index Service; The Commission for Relief in Belgium Fellowships</i> .....	
	444
<i>Scientific Notes and News</i> .....	446
<i>University and Educational Notes</i> .....	450
<i>Discussion and Correspondence:</i>	
<i>The Tilden Meteor, an Illinois Daylight Fall:</i>	
PROFESSOR CHARLES CLAYTON WYLIE. <i>Etiology of European Foul-Brood of Bees:</i> DENIS R. A. WHARTON. <i>Note on a Second Occurrence of the Mosasaurian Reptile, Globidens:</i> CHARLES W. GILMORE. <i>More and Better Ethics for Scientific Men:</i> PROFESSOR ROBERT C. MILLER .....	451
<i>Scientific Books:</i>	
<i>Brunet's Les Physiciens Hollandais et la Methode Experimentale and Bernard's Introduction to the Study of Experimental Medicine:</i> DR. JONATHAN WRIGHT .....	
	453
<i>Special Articles:</i>	
<i>Long-lived Cells of the Redwood:</i> DR. D. T. MACDOUGAL and DR. GILBERT M. SMITH. <i>Glucose as an Antagonist:</i> ALEX. D. BAKER and W. A. DELONG. <i>Geochronology as based on Solar Radiation:</i> GERARD DE GEER .....	
	456
<i>The National Academy of Sciences</i> .....	460
<i>Science News</i> .....	x

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

## THE SCIENCE PRESS

New York City: Grand Central Terminal.

Lancaster, Pa.

Garrison, N. Y.

Annual Subscription, \$6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 8, 1879.

## SPECIALIZATION AND COOPERATION IN SCIENTIFIC RESEARCH<sup>1</sup>

THE three great functions of a university are to train young people in the art of living, to guide them in the search for truth and actually to engage in the pursuit of truth. The first two of these are universally agreed upon and endorsed, but not so universal and whole-hearted is the recognition of the third—the research function of an institution of higher learning. In some quarters the research aspirations of a university meet with distinct disapproval as encroaching upon the supposedly more serious business of the institution. In other quarters they are viewed with grudging or amused tolerance as harmless little idiosyncrasies in which scholarly men must be indulged in order to keep them contented and out of mischief. In the more enlightened quarters, however, it is realized that a university can not best perform any of its functions or measure up to its opportunities unless full and ungrudging support is given to its attempts to advance human knowledge.

In such a gathering as this I need make no defense of research as a valuable and legitimate activity of a university. It may not be out of place, however, briefly to review some of the considerations which are involved. These naturally fall under three heads, of which the first is

I. *Advantage to the student.* If ability to think clearly and independently, to organize all his available mental resources, to direct his best efforts for the purpose of solving problems and meeting difficult situations is a thing worth gaining, then research is an important part of a student's training. For the carrying on of research and its success depend on the degree to which these qualities of the mind can be focused on the problem. And what qualities of the mind are more important to develop than these? They can not be developed by that woefully overdone method of teaching by the easier process of fact-cramming. To learn a thing one must do it. To develop these mental traits they must be exercised. And the exercise of these mental traits, focused on some problem, is research.

Another advantage of research to the student is to be found in its stimulation of his interest. Nowadays people are not interested in things static, they

<sup>1</sup> Address delivered at the Founder's Day Exercises, Lehigh University, on October 5, by Professor K. T. Compton, Princeton University.

## NOVEMBER PUBLICATIONS

### Dictionary of Bacteriological Equivalents \$4.00

By WILLIAM PARTRIDGE, F.I.C.

*Formerly Lecturer in Chemistry, King's College,  
University of London*

A new and unique dictionary of bacteriological terms. Names the diseases of man, animals, and plants in four languages. Contains 2,400 French equivalents, 2,600 German, 1,200 Italian, and 1,600 Spanish equivalents in English. A valuable handbook for bacteriologists, medical workers, and biologists.

Cloth 5 x 7 $\frac{1}{4}$  156 pages

### Food Infections and Food Intoxications \$4.00

By SAMUEL REED DAMON

*Associate Professor of Bacteriology, School of  
Hygiene and Public Health, Johns  
Hopkins University*

A modern study, the first since 1917, presenting a comprehensive summary of modern knowledge of foods and their infections, including the phases of etiology, symptomatology, diagnosis, treatment and prophylaxis, including much new material drawn from recent researches. The treatment is clear and practical, and may be readily understood by the non-technical reader. A valuable and serviceable book for clinicians, health workers, and laboratory men. Should be in every library on household economics and dietetics.

Cloth 6 x 9 264 pages  
16 half tones

## Also Published in November

### An Elementary Laboratory Guide in General Bacteriology \$3.00

By HAROLD J. CONN. A student manual intended to supplement Conn and Conn's *Bacteriology*.

### Fighters of Fate \$3.00

By J. ARTHUR MYERS. Tells the life stories of 24 men and women who achieved success in art, science, politics, etc., despite the handicap of tuberculosis.

### The Community Use of Schools \$3.00

By ELEANOR T. GLUECK. The first adequate study of the relation of the schoolhouse to community welfare, and the community center movement.

*Order From*

### The Williams & Wilkins Company

*Publishers of Scientific Books and Periodicals  
Baltimore, Maryland*



## School of Medicine

### NEW ADMISSION REQUIREMENTS

At least three years of approved college work including specified requirements in the sciences.

### DEGREE OF B.S. IN MEDICAL SCIENCE

This degree may be awarded at the end of the third or fourth year to students fulfilling certain conditions including the preparation of a thesis.

### DEGREE OF DOCTOR OF MEDICINE

Upon satisfactory completion of prescribed four-year course.

For catalogue and information, address  
**THE DEAN, Washington University  
School of Medicine, St. Louis,  
Missouri**

## NEW SCIENTIFIC BOOKS

**J. B. Lippincott Company, Philadelphia**

THE CLIFF DWELLERS OF KENYA. J. A. Massam. 261 pp.

An account of a people driven by raids, famine and drought to take refuge on the inaccessible ledges of precipitous mountains, with a description of their ways of living, social system, religion, etc. Written by the district commissioner of the colony.

**The World Book Company, Yonkers, New York**

INTRODUCTORY CHEMISTRY. Neil E. Gordon. xx+600 pp. \$2.20.

This text-book covers the prescribed course for high-school students who intend to enter college with credit for a year of chemistry. The presentation of the material in the book takes into account the newer chemical theories and the newer knowledge of educational principles.

**Harcourt, Brace & Company, New York**

THE SOCIAL BASIS OF CONSCIOUSNESS. Trigant Burrow. 251 pp. \$4.00.

A study in organic psychology, based upon a synthetic and societal concept of the neuroses. The book is the result of years of laboratory research in the subjective reactions of social beings.

## SCIENTIFIC PERIODICALS

Chemical, Medical and allied subjects: Complete files, volumes and copies, bought and sold. Kindly send us a list of your wants and items of which you may wish to dispose.

**B. LOGIN & SON**

29 East 21st Street

New York, N. Y.

# A NEW FILTER PUMP

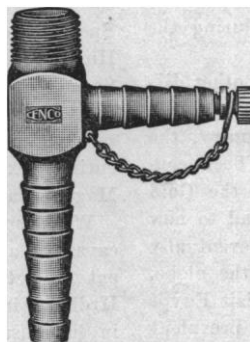
*of Higher Efficiency and Lower Cost*

## THE CENCO-HARRINGTON FILTER PUMP

and

### HOSE NIPPLE COMBINED

The Only Aspirator Whose Performance is Definitely Rated in Terms of Water Pressure, Rate of Evacuation, Water Consumption and Ultimate Pressure Produced.



A Product Representing the Combination of Many Months of Research in Producing Satisfactory Performance with Effective and Economical Mechanical Design.

#### SPECIAL FEATURES

1. Lower price for equal aspirating efficiency.
2. Lower rate of water consumption per volume aspirated.
3. Combined hose nipple and aspirator.
4. Compactness and beauty of design and appearance.
5. Serrated hose and aspirating arm connections.
6. Check valve in aspirator arm to prevent sucking back.
7. Constructed of non-corrodible aluminum alloy with brass jet diaphragm and brass plate-valve. The brass plate-valve in the aspirating arm prevents sucking back should the water pressure suddenly diminish.
8. A threaded cap is supplied for plugging the aspirating arm for converting the pump to a hose nipple. The threaded cap is attached to the pump body by means of a short length of chain.

#### SPECIFICATIONS


Total length,  $3\frac{1}{8}$  inches; size of I. P. thread,  $\frac{3}{8}$  inch. Will take No. 5480C or No. 5482C Filter Pump Coupling.

#### PERFORMANCE

The efficiency of an aspirator for chemical laboratory work is measured by two factors, speed of exhaustion, and water consumption. The Cenco-Harrington pump has been found to satisfy both these factors of desirability. At 30 lbs. of water pressure, the pump will evacuate a 2000 cc container to the vapor pressure point of water in two minutes with a water consumption rate of 18 lbs. per minute.

For further information on the new principles involved in No. 5472 Filter Pump, send for Reprint J28, "A New Type of Aspirator of High Efficiency," by E. L. Harrington.

**CENTRAL SCIENTIFIC COMPANY**

LABORATORY  SUPPLIES

Apparatus  Chemicals

460 E. Ohio St.

Chicago

U.S.A.

# The American Naturalist

*A Bi-Monthly Journal, established in 1867, Devoted to the Advancement of the Biological Sciences  
with Special Reference to the Factors of Organic Evolution and Heredity*

## NOVEMBER—DECEMBER

- On Endocrines and Organisms. Dr. Oscar Riddle.  
The Effects of Alcohol on Birth Weight and Litter Size in the Albino Rat. Professor Frank Blair Hanson and Florence Heys.  
A Lethal Mutation in Maize affecting the Seed. Dr. R. A. Brink.  
Polyandry in the Grouse Locust. Dr. Robert K. Nabours.  
A Sire's Breeding Index with special reference to Milk Production. Dr. H. D. Goodale.  
The Pigmentation of Human Head-hair. Dr. Leon Augustus Hausman.  
A Study in American Paleohistology. Dr. Gale E. Wilson.  
Shorter Articles and Discussion: Occurrence of the Marine Crab, *Callinectes ornatus* in Brackish and Fresh Water: Professor C. T. Brues. Y-Chromosome Inheritance: Dr. Robert C. Robb. The Chromosomes of *Ranunculus acris*: Helen Sorokin.  
Index to Volume LXI.

## JANUARY—FEBRUARY

- The Origin of Species, V: Speciation and Mutation. Dr. Henry F. Osborn.  
Do Albino Rats having Ten Generations of Alcoholic Ancestry Inherit Resistance to Alcohol Fumes? Professor Frank Blair Hanson and Florence Heys.  
Genetic Experiments with Pond Snails, *Lymnaea* and *Physa*. Edward Drane Crabb.  
Variability and Racial Mixture. Melville J. Herskovits.  
Shorter Articles and Discussion: The Experimental Production of Melanism in Lepidoptera: Dr. C. R. Plunkett. A Gynandromorph in *Drosophila funebris*: Warren P. Spencer. The Genetics of Hen-feathering in Chickens: Horace W. Feldman. Counted Grain Pollination in *Mirabilis jalapa* L.: S. C. Harland and J. C. Haigh.

## MARCH—APRIL

- Symposium on Growth in Health and Disease: Some Aspects of Sexual Difference in Prenatal Growth and Death: Dr. Oscar Riddle. On the Distribution of Differences in Vitality among Individuals: Professor Raymond Pearl. The Functional Significance of the Suprarenal Cortex: Professor W. W. Swingle. The Implications of the Differential Growth Retardation in Conditions of Thyroid Deficiency: Dr. Frederick S. Hammett.  
Symposium on Some Biological Aspects of Medical Problems: Mycology in Relation to Human Pathology: Dr. C. L. Shear. Human Types in Relation to Medicine: Professor R. Bennett Bean. The Needs of Medical Entomology: Dr. L. O. Howard. Hormone Control of Cyclic Growth and Function of the Female Genital Organs: Dr. Edgar Allen.

## MAY—JUNE

- Fishing with the Otter. Dr. E. W. Gudger.  
The Polychaete Ancestry of the Insects. Professor L. B. Walton.  
Factors in Phylogenetic Development. A. W. Lindsey.  
Changes of Environment as Cause of the Origin of Varieties or Subspecies. Dr. N. A. Borodin.  
Duplicity in Birds. Professor F. E. Chidester.  
Shorter Articles and Discussion: Genetics and the Problems of Development: R. A. Brink. The Origin of the Blind Goby of the California Reefs: Dr. Carl L. Hubbs. A Study of Gynandromorphic Katydid: Nathan E. Pearson.

## JULY—AUGUST

- Experimental Studies on the Duration of Life. XI. Density of Population and Life Duration in *Drosophila*. Raymond Pearl, John Rice Miner and Sylvia L. Parker.  
Sex and Sex-determination in the Light of Observations and Experiments on Diecious Plants. Professor John H. Schaffner.  
A Factorial Analysis of Certain Shape Characters in Squash Fruits. Dr. Edmund W. Sinnott.  
Adaptations of the Bathypelagic Nemertean. Professor Wesley R. Coe.  
The Scarabæus of the Ancient Egyptians. Harry B. Weiss.  
Mendel's Letters to Carl Nägeli. Margaret Mann Lesley.  
Shorter Articles and Discussion: On the Winter Food of the Tree Swallow and the Myrtle Warbler: Dr. L. A. Hausman. On the Absence of Iso-agglutinins in Rats: Dr. W. V. Lambert.

## SEPTEMBER—OCTOBER

- Character of Cells attaining Great Age. Dr. D. T. MacDougall and Frances L. Long.  
Quantitative Methods in Genetic Research. Professor H. J. Muller.  
Quantitative Methods of Research and the Problems of Animal Breeding. Dr. John W. Gowen.  
The Convergent Improvement of Selfed Lines of Corn. Frederick D. Ritchey.  
Reversal of Dominance and Production of a Secondary Sexual Character in the Mediterranean Flour-moth. Dr. P. W. Whiting.  
Mutations: Their Nature and Evolutionary Significance. Professor R. Ruggles Gates.  
The Migration of Animals from the Ocean into Freshwater and Land Habitats. Professor A. S. Pearse.  
Shorter Articles and Discussion: The Epistatic Effect of Vestigial in *Drosophila*: Dr. Charles F. Poole. A Dominant Body Color in *Drosophila repleta*: Dr. Robert L. King.

Single Number \$1.00

Yearly Subscription, \$5.00

**THE SCIENCE PRESS**

GRAND CENTRAL TERMINAL, NEW YORK CITY