Putting Heads Together

On the basis of a report submitted by his science advisory committee, President Eisenhower is moving to bring together in a new Federal Council for Science and Technology the heads of various Government research and development programs so that they may offer advice about how their separate policies may be more effectively integrated. According to the report, which is excerpted in this issue of Science (page 85), one possible item for the council's agenda is the advisability of setting up a Government-supported laboratory for the study of such metals and materials as might be required by advanced forms of rocketry. Another possible item on the agenda is the advisability of increasing Government support for basic research by building expensive pieces of equipment such as particle accelerators.

Almost everyone seems agreed that some mechanism is required for overseeing the total federal effort in science besides the review afforded by the Bureau of the Budget. The future course of this particular mechanism, however, will depend on several elements.

Initial membership on the Federal Council for Science and Technology, as proposed in the report, will be given to the eight federal agencies that together administer over 95 percent of Government research and development. The agencies that are primarily scientific—the Atomic Energy Commission, the National Science Foundation, and the National Aeronautics and Space Administration—will be represented by the agency heads. The agencies with diverse research and development activities—the Departments of Defense, Interior, Commerce, Agriculture, and Health, Education, and Welfare—will be represented by, so to speak, vice presidents in charge of research. To date, only the Department of Defense has such an officer, in the person of its director of Defense Research and Engineering.

The interested parties will all be represented on the council, but in a bureaucratic committee, especially at this high a level, certain factors may operate against the group's effectiveness. For one thing, a group of people each of whom is himself vulnerable to loss is unlikely to produce a variety of new ideas. For another, people caught up in matters of day-to-day urgency are unlikely to give sustained attention to matters of long-range concern. A third reason is that a committee with the power only to advise may find itself without an audience. But there are also factors that may make for success, and these hinge in good measure on whether the committee has as its chairman a man who is able to force issues, who is able to acquire a staff competent to consider long-range questions, and who is able to get the people who have the power to act to listen to him.

If Charles E. Wilson is an example of the man with access to the President who never learned that what is good for science is good for the country, then James R. Killian is an example of the man who is able to get top-level scientific opinion to top-level policy makers. Since the report calls for the President's science adviser to be the chairman of the new council, and since that person is Killian, there is every expectation that the council's recommendations will be vigorous and that they will be followed.

Although the future course of the Federal Council for Science and Technology will depend upon the council's effectiveness, it will also depend upon events outside the council's scope. In particular, the future course will depend on whether the push towards closer cooperation among the Government's scientific agencies stops with the council or moves on to the establishment of a Department of Science. A Department of Science may be regarded with enthusiasm or dismay, but it is something that we are all going to hear a lot about in the next six months.—J.T.
Tri-Carb* Liquid Scintillation Spectrometers

Tri-Carb Spectrometers are designed for counting tritium, carbon-14 and other beta-emitting isotopes. Up to 100 5-dram sample vials can be counted at each loading.

Tri-Carb Spectrometers are also available with manual sample chambers. Both automatic and manual models offer all the advantages of liquid scintillation counting—sensitivity, versatility, operational simplicity and ease of sample preparation.

Auto-Gamma* Sample Changers

Auto-Gamma Sample Changers are designed for use with standard well-type scintillation detectors. Up to 100 test tubes (16 mm x 150 mm) can be counted at each loading.

Auto-Gamma Sample Changers are available for many different systems. They can be provided as complete units with either large or small sodium iodide crystals. They can also be used with scintillation spectrometers and simple scaler systems.

Automatic Tri-Carb Spectrometers and Auto-Gamma Sample Changers can be operated 24 hours per day, seven days per week. Operation is on the basis of both preset time and preset count. Counting is stopped by whichever is reached first. Sample number, time interval and scaler readings are permanently recorded on paper tape.

Scaler and readout circuits, similar in both instruments, are completely transistorized for utmost reliability.

REQUEST LATEST BULLETINS

WINDOWLESS and FLO-WINDOW* COUNTERS

...for geiger and proportional operation

Windowless Flow Counters provide maximum sensitivity and essentially unlimited life. Full 2\pi geometry is achieved.

Flo-Window Counters feature thin plastic windows for minimum absorption. Counting chambers are isolated from the samples so that static charge, vapor effect, contamination, etc. are eliminated.

Completely Transistorized Proportional Counting Amplifiers

These non-overloading amplifiers are designed for use with proportional counters. They provide a gain of 1100 and are small enough to be conveniently located with the detectors, thus eliminating preamplifiers.

*Trademarks

Packard Instrument Company, Inc.

DEPT. A • P. O. BOX 428 • LA GRANGE, ILLINOIS
SAN FRANCISCO • CHICAGO
NEW YORK

SCIENCE, VOL. 129
Meetings

Subcellular Particles

The 13th annual meeting of the Society of General Physiologists was held at the Marine Biological Laboratory, Woods Hole, Mass., 9-11 June. Contributed papers were presented, and the annual business meeting was held, 9 June. A symposium organized by Teru Hayashi of Columbia University on the "Function of Subcellular Particles" was held 10-11 June.

The society has, from its birth, brought together animal, plant, and microbial physiologists to discuss functions of cells which are common to all organisms. This policy has resulted in interesting and stimulating symposia, often revealing relations between different fields which had not been appreciated. This year's symposium served to bring to the attention of general physiologists recent developments in the study of functional aspects of subcellular particles, particularly the biochemical activities of these entities. On the other hand, the biochemists had an opportunity to become acquainted with the effects of surface and structural factors in biochemical reactions. Arrangements have been made to publish the 1958 symposium in the monograph series of the American Physiological Society. Four previous symposia sponsored by the Society of General Physiologists have been published in this series.

The tone of the symposium was set in a critical review by the first speaker, A. B. Novikoff (Albert Einstein College of Medicine). His comprehensive examination of the work of various investigators working on the physiology of submicroscopic structures put the problems facing workers in this field in sharp focus. The next two speakers of the initial session dealt with the effects of surfaces as structural factors and their effect on biochemical reactions. A. D. McLaren and K. L. Babcock (University of California) presented striking evidence of localized differences in pH at intracellular interfaces and gave examples of the effect of such differences on biochemical reactions. The nonapplicability of classical kinetics for these phenomena was stressed. S. Siegel (Rochester University) then presented experimental evidence for the view that surfaces per se, depending on their nature, may act as "catalytic agents" for such physicochemical reactions as the polymerization of certain substances, such as lignin. He showed clearly that the formation of lignin in the plant and in vitro systems is dependent on the same surface factors.

In the second session, G. E. Palade (Rockefeller Institute), with a series of technically brilliant electron micrographs, illustrated the morphological changes of subcellular particles correlated with the physiological condition of the cells. Especially noteworthy were the changes in the synenogen granules of the pancreas and changes in the endoplasmic reticulum depending on the secretory activity of the cells. He was followed by E. L. Kuff (National Institutes of Health), who presented work on the isolation and identification of the Golgi apparatus and the biochemical properties of this subcellular entity. D. E. Green (University of Wisconsin) next summarized the work of the Wisconsin group on the fragmentation and analysis of the mitochondrion. He postulated that the mitochondrion is composed of subunits which can be separated by mechanical means, each subunit being composed of enzyme moieties separable only by drastic chemical means. Most interesting was the prominence given to the lipoproteins and their possible function, especially in the electron transport particle. He concluded that the molecular parts of the mitochondrion appeared to be held in a stable structure, and that their reactions did not seem to depend on thermal collisions, as in a free solution.

The final paper of this session, by M.
Kodak reports on:

finding a trivially named organic in a pedantically named list ... a device with enormous potentialities for inventiveness ... tocopherol, three years and 1384 papers later

PAN—PAR

We have been counting on a man who needs a reagent for copper and zinc to go unerringly to our catalog and look up o-[(2-α-(2-Hydroxy-5-sulfophenylazo)benzylidene)hydra-zone]benzoic Acid Sodium Salt (Eastman 7199) in the alphabetical listing. To work like that, a man needs to be very smart in an overspecialized sort of way. By neglecting to list this compound under its trivial name Zincon (zinc and copper, get it?) we haven’t shown much brilliance ourselves. Our devotion to Chemical Abstracts nomenclature is commendable, justifiable, and sometimes fatuously self-sacrificing. We are holier than most chemical houses. Why, we know of some producers of dyestuffs very useful in the laboratory who refuse orders written in the systematic nomenclature, much less encourage them!

Between trademarks—which specify only commercial origin for merchandise otherwise named as to kind—and systematic but pedantic chemical names lies the convenient middle ground of trivial names (trivial: three roads, i.e., the fork where the people meet to chat, get that?). Some are trademarks abandoned by their owners, some are pronounceable combinations of letters from the systematic name, some are little slogans concocted by enthusiastic chemists who discovered the uses.

It has suddenly struck us that a few of the names neither cross-referenced in our catalog nor familiar to everybody gabbing at the crossroads, should be put in the hands of every chemist interested enough to ask. Sample entries:

PAN—1-(2-Pyrdazylazo)-2-naphthol
PAR—4-(2-Pyrdazylazo)resorcinol
Tiron—4,5-Dihydroxy-m-benzenedisulfonic Acid Disodium Salt (Eastman 7062), reagent for titanium and iron (Also called sodium catecholdisulfonate)
Tiron—o-(2-Hydroxy-3,6-disulfo-1-naphthylazo)benzenearsonic Acid Disodium Salt (Eastman 6748), reagent for thorium
Tope—Tri-n-actylphosphate Oxide
Pyrocatechin Violet—Pyrocatecholsulfonephthalein
Blue Tetrozolium—2,3,5-Triphenyl-2H-tetrozolium Chloride (Eastman 6533)

Handy little reference book when transcribing notes from a cocktail napkin. You get a copy from Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company). To use it the way we want you to, you must also have a copy of Eastman Organic Chemicals, List No. 41, which gives the prices and package sizes for all the 3700 organicas we stock.

The wordy vitamin

In the three years 1955 through 1957, there have appeared to our knowledge 119 papers in the world’s scientific literature on the occurrence and distribution of vitamin E, 60 on the determination of vitamin E, 148 on its chemistry, 362 on its relation to physiology and pathology, 85 on its pharmacology, 275 on its role in nutrition and metabolism, and 335 on its medical and therapeutic uses. There has been an international congress on vitamin E in Venice, and the vitamin has been definitely related to the hatchability of turkey eggs, with weighty consequences for turkey economics.

Because we like to think of ourselves as a potent force in the investigation and commercial production of vitamin E, one or the other of us has, with varying degrees of belief, read every one of these papers. We have subsequently prepared an annotated bibliography of them for distribution by the National Vitamin Foundation, 149 East 78th Street, New York 21, N. Y., the fourth such we have done. If you have use for a copy, you can state your case to the Foundation.

Now that it is printed, we have at least one regret. On page 36 we see the word “preventative.” Rhetoricians deplore the word “preventative.”
Kamen and J. Newton (Brandeis University), dealt with their investigations on photosynthesis phosphorylation in bacterial chromatophores. They compared the activity of their bacterial particle system with the particulates from green plants and found that, despite the anaerobic nature of the bacteria, definite similarities existed. A promising immunoochemical technique opening the way to a molecular localization of the active portions of the particulates was also described.

Christian DuDuve (Louvain, Belgium) gave a comprehensive review of the concept of the lysosome as an intracellular particle containing hydrolase enzymes. He first outlined the evidence for the concept and then the evidence pointing to the possible function of lysosomes in the cell in digestion (as related to pinocytosis), autolysis, and necrosis. DuDuve was followed by Mary Stephen- son, who, together with J. Littlefield, L. Hecht, R. B. Lofthfield, and P. C. Zamec nik (Harvard University), presented a summary of the reactions preceding the advent of the ribonucleoprotein particle in protein synthesis. They envisaged a reaction which involves, first, the activation of the amino acid by a specific enzyme, requiring adenosinetriphosphate; second, a soluble ribonucleic acid which incorporates specific nucleotide end groupings and which then can bind the amino acids. This soluble ribonucleic acid can then, presumably, transfer the bound amino acids to microsomal ribonucleic acid and microsomal protein.

Polynucleotide synthesis, studied in situ by high-resolution autoradiographic techniques, was presented by J. H. Taylor and P. Woods (Columbia University). They demonstrated that tritiated cytidine appears first in the nucleolus (although with longer incubation periods the label appears in the chromosomes also). They concluded that polynucleotide synthesis, presumably ribonucleic acid, as indicated by ribonuclease digestion, takes place in the nucleolus.

The final paper of the symposium was presented by V. Allfrey (Rockefeller Institute) and dealt with the biochemical properties of the isolated nucleus. Activities including amino acid uptake and turnover of energy-rich phosphate could be demonstrated. A lively discussion of the conditions for centrifugal isolation of the nuclei and retention of these biochemical activities, and of an interesting salt dependence of the isolated nuclei, followed the presentation of the paper.

Results of the mail balloting for officers and council were announced at the business meeting. C. Ladd Prosser became president, and William D. McElroy was elected vice president. A. C. Giese and T. Hayashi were elected to serve 2-year terms as councilors.

The abstracts of the contributed papers are to be published as a supplement in the October issue of the Journal of Cellular and Comparative Physiology.

Teru Hayashi
Department of Zoology, Columbia University, New York, New York
F. G. Sherman
Department of Biology, Brown University, Providence, Rhode Island

Forthcoming Events

February

9-11. American Acad. of Allergy, Chicago, Ill. (B. Rose, Royal Victoria Hospi tal, Montreal, P.Q., Canada.)
9-11. Nature of Coal, symp., Bihar, India. (Director, Central Fuel Research Inst., P. O. Fuel Research Inst., Dhanbad District, Bihar.)
14. Short Range Navigation Aids, Montreal, Canada. (Intern. Civil Avia-
Now Available: Volume 10 (1959)

ANNUAL REVIEW OF

PSYCHOLOGY

Editor: P. R. Farnsworth
Associate Editor: Q. McNemar
Editorial Committee: J. M. Butler, P. R. Farnsworth, D. B. Harris, L. G. Humphreys, J. MeV. Hunt, C. T. Morgan

CONTENTS:

Developmental Psychology, G. G. Thompson
Learning, H. H. Kendler
Vision, J. W. Gehard
Audition, L. A. Jeffress, and G. Moushegian
Individual Differences, C. W. Harris, and C. E. Bereiter
Personality, R. R. Blake, and J. S. Mouton
Social Psychology and Group Processes, J. C. Gilchrist
Physiological Psychology, H. E. Rosvold
Abnormalities of Behavior, R. W. White
Theory and Techniques of Assessment, J. Loewinger
Educational Psychology, J. M. Stephens
Counseling, R. F. Berdie
Psychotherapy, L. Luborsky
Statistical Methods, D. A. Grant
Problem Solving and Thinking, R. M. Gagne
Motivation, C. N. Cojer
Further Developments in Psychology in U.S.S.R., A. Mintz

Approx. 555 pages

$7.00 postpaid (U.S.A.); $7.50 postpaid (elsewhere)

ANNUAL REVIEWS, INC.
Grant Avenue, Palo Alto, California
New Items from the 1958-59 Matheson Gas Catalog

New Gases
Bromine Pentfluoride
Iodine Pentfluoride
Carbon Tetrafluoride (Tetrafluoromethane)
Dichlorofluoromethane
1,1-Difluoro-1-Chloroethane

Gas Mixtures
Radioactive gases — mixed with stable gases or gas mixtures.

Regulators
Single-stage pressure regulators giving higher delivery pressure
and better delivery pressure control. Complete specifications shown
for each regulator.

Valves
All purpose instrument-type valves for high pressure and high
vacuum.

Safety Equipment
Single and double cylinder hand trucks. Cylinder Stands.

The Matheson Company, Inc.
Compressed Gases and Regulators
East Rutherford, N. J.; Joliet, Ill.; Newark, Calif.

"Multiple Unit"
MUFFLE FURNACE
Temperatures to 1850° F.

This furnace is a complete self-contained unit with the temperature
indicating and controlling devices conveniently located in the pyramidal base.
Four interchangeable and reversible heating units of heavy
gauge Nickel Chromium Wire installed in grooved refractory plates
completely surround the heating chamber.

Write for Bulletin 849 for complete details.

<table>
<thead>
<tr>
<th>Type</th>
<th>Watts</th>
<th>Chamber</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>051-PT</td>
<td>1150</td>
<td>W.</td>
<td>L.</td>
</tr>
<tr>
<td>052-PT</td>
<td>1440</td>
<td>4½</td>
<td>10</td>
</tr>
<tr>
<td>054-PT</td>
<td>2070</td>
<td>5½</td>
<td>12</td>
</tr>
<tr>
<td>056-PT</td>
<td>3400</td>
<td>7½</td>
<td>14</td>
</tr>
<tr>
<td>012148-PT*</td>
<td>6500</td>
<td>11½</td>
<td>14</td>
</tr>
</tbody>
</table>

Operating voltage either 115 or 220 volts A.C. only except 012148-PT is 230 volt only.
*Automatic temperature control $230.00 additional.

Hevi-Duty Electric Co.
Milwaukee 1, Wisconsin

March
1-2. Pennsylvania Acad. of Sciences, Gettysburg. (K. Dearolf, Public Museum
and Art Gallery, Reading, Pa.)
1-5. Gas Turbine Power Conf., Cincinnati,
Ohio. (O. B. Schier, ASME, 29 W.
39 St., New York, N.Y.)
8-9. American Broncho-Esophagological
Assoc., Hot Springs, Va. (F. J. Put
ney, 1712 Locust St., Philadelphia, Pa.)
8-9. American Laryngological Assoc.,
Hot Springs, Va. (J. H. Maxwell,
University Hospital, Ann Arbor,
Mich.)
8-12. Aviation Conf., Los Angeles
Calif. (O. B. Schier, ASME, 29 W.
39 St., New York, N.Y.)
10-12. American Laryngological, Rhin
ological and Otological Soc., Hot Springs,
Va. (C. S. Nash, 708 Medical Arts Bldg.,
Kensington 7, N.Y.)
Springs, Va. (L. R. Boies, University Hos
tial, Minneapolis 14, Minn.)
13-15. Alabama Acad. of Sciences, Aub
burn, (H. M. Kaylor, Dept. of Physics,
Birmingham-Southern College, Birming
ham, Ala.)
15-20. American College of Allergists,
San Francisco, Calif. (M. C. Harris, 450
Sutter St., San Francisco.)
16-19. American Assoc. of Petroleum Geologists, Soc. of Economic Paleontologists and Mineralogists, 44th annual, Dallas, Tex. (W. A. Waldschmidt, AAPG, 311 Leggett Building, Midland, Tex.)


16-20. Western Metal Exposition and Cong., 11th, Los Angeles, Calif. (R. T. Bayless, 7301 Euclid Ave., Cleveland 3, Ohio.)


18-25. International Social Science Council, 4th general assembly (by invitation), Paris, France. (C. Levi-Strauss, Secretary-General, International Social Science Council 19, avenue Kleber, Paris.)

19-21. Society for Research in Child Development, NIH, Bethesda, Md. (Miss N. Bayley, Laboratory of Psychology, National Inst. of Mental Health, Bethesda 14, Md.)


29-3. Latin American Congress of Chemistry, 7th, Mexico D.F., Mexico. (R. I. Frisbie, Calle Ciprés No. 176, Zone 4, Mexico, D.F.)


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


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, Pa.)


(See issue of 19 December for comprehensive list)
New continuous-duty rotary agitator holds up to 12 test tubes or small vessels... to free you for other work in the lab.

The SPINNERETTE

Typical applications:
- effecting small-scale extractions, and mixing of solutions, emulsions, dispersions or colloids.
- cultivating organisms, viruses, tissue cultures or cells.
- blood analysis and small-scale dialysis.

Designed for optimum variation in rate of mixing or agitation by virtue of vertical-to-horizontal tilt angle of platform plus four rotating speeds (15, 30, 45 and 80 rpm). Affords smooth, quiet and maintenance-free service and can operate anywhere—on a work table or mounted on a wall.

Interchangeable platforms available to hold small bottles and small Erlenmeyer flasks.

Write for Bulletin ST-S3

NEW BRUNSWICK SCIENTIFIC CO.

PRECISION LABORATORY APPARATUS

P.O. BOX 606 • NEW BRUNSWICK, N. J.

NEW! CECO® Mobile Laboratory

For science teacher demonstrations in different locations, any vantage point. Moves quickly. Equipped with gas, electric and water services, support rods and pegboard display panel. Roomy storage area. In attractive colors, large Formica top.

Write for full details.

EACH $295.00

Cenco, the leading manufacturer of instruments for laboratories

CENTRAL SCIENTIFIC CO.

1718-M IRVING PARK RD. • CHICAGO 13, ILL.

Branches and Warehouses — Baltimore • Buffalo • Boston • Dallas • Detroit • Chicago • Los Angeles • Tulsa

Indians • Toronto • Montreal • Vancouver • Ottawa

Tired of shaking test tubes by hand?

GLASS ABSORPTION CELLS made by KLETT

Klett-Manufacturing Co.

179 East 87 Street, New York, New York

BIND 'EM... and you'll find them!

Keep your copies of SCIENCE always available for quick, easy reference in this attractive, practical binder. Simply snap the magazine in or out in a few seconds—no punching or mutilating. It opens FLAT—for easy reference and readability. Sturdily constructed—holds 26 issues.

This beautiful maroon buckram binder stamped in gold leaf will make a fine addition to your library. Only $3.25 postpaid; add 50¢ for orders outside U.S.A. (Personal check or money order, please.)

Name of owner, 75¢ extra; year of issue, 50¢ extra.

SCIENCE • 1515 Massachusetts Ave., NW, Washington 5, D.C.
Equipment

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Science does not assume responsibility for the accuracy of the information. A coupon for use in making inquiries concerning the items listed appears on page 119.

- **PHOTORELAY** combines a cadmium-sulfide cell with a double-pull, double-throw relay with contacts rated at 5 amp, 120 volts a-c. Spectral response is S-15. The unit will operate with 1 ft-ca intensity. Weatherproof enclosures are available. (Berkeley/Dynamics, Dept. 580)

- **METERING PUMP** for chemical solutions produces a range of flow from 0 to 2.0 ml/min with accuracy of 0.01 ml/min. All parts in contact with the fluid being pumped are made of glass or Teflon. Flow is regulated by the controlled displacement of a piston. Flow is adjusted by a dial calibrated in milliliters per minute. Other models provide flow rates up to 10 ml/min. (Harold Kruger Instruments, Dept. 566)

- **FORCE CALIBRATION SYSTEM** is transistorized and battery operated. During operation the force is applied to a load ring that has a differential transformer attached to its internal bosses. Deflection is transmitted to a null-balance instrument where it is balanced against the measured displacement of another transformer. Sensitivity is 20 µa/0.0001 in. of ring deflection. Accuracy is ±0.1 percent. Current drain in operation is 20 µa. (Morehouse Machine Co., Dept. 567)

- **SIGNAL GENERATOR** produces sine-wave or square-wave signals in five bands from 5 cy to 600 kcy/sec. Accuracy of frequency setting is ±1 percent or 1 cy/sec. Amplitude is constant within ±1 db. Output level is 10 v r.m.s. into 600 ohm. Distortion at this level is less than 1 percent. (Precision Apparatus Co., Dept. 568)

- **OSCILLATOR** for operation at any specified frequency in the range 8 to 150 Mcy/sec is 1¾ in. long and ¾ in. in diameter. Frequency stability is ±0.005 percent. Output power is 0.1 to 1.0 mw. Output impedance is 50 to 1000 ohm. Operating temperature range is −55° to +75°C or −55° to +105°C. (Delta-f, Dept. 571)

- **OPTICAL COMPARATOR** projects simultaneous images through separate optical systems to permit viewing of an object in two planes. The two optical systems may be the same or they may differ in magnification, focal length, or projection path. Separate screens or common screens range from 3 ft square to 20 in. in diameter. Triple systems are also possible. (Stocker & Yale, Dept. 575)

- **TORQUEMETER** measures torque in ranges from 5 to 250 oz-in. full scale. Dynamic torques are measured on shafts turning between 50 and 12,000 rev/min. Accuracy is ±2 percent of full scale. The indicator may be located remotely and connected electrically to the torque pick-up. Overload protection up to twice the rated load is provided. Shafts are ¾ in. in diameter by 7/16 in. long. (Metron Instrument Co., Dept. 570)

- **CULTURE APPARATUS** for large quantities of bacteria, yeasts, molds, and other microorganisms consists of a double-walled, cylindrical stainless-steel chamber which houses the culture with aeration fins. The chamber measures 16 in. in diameter by 30 in. high. Front controls govern sterilization and agitator speed. Liquid nutrient is added and bacterial suspension is removed at the same rate through a cooling bath, and the cells are separated in a centrifuge. (American Sterilizer Co., Dept. 578)

- **PRESSURE PICKUPS** of variable reluctance type cover pressure ranges from zero to 5000 lb/in.² gage, differential or absolute. Operating temperature range is −85° to +500°F. Zero drift is less than 10µw/v °F, and sensitivity drift is less than 0.02 percent of full scale per degree Fahrenheit. (Tavis Instruments, Dept. 579)

- **GAS ANALYZER** enables measurement of concentration of one gas in a multicompontent mixture without chemical or physical changes in the gas mixture. The
The American Association for the Advancement of Science announces three new symposium volumes of the utmost importance to psychiatrists, neurologists, clinical psychologists, physiologists, pharmacologists, and biochemists—and of great interest to the general public.

**Tranquilizing Drugs**
6" x 9", 205 pp., 32 illus., references, index, cloth, March 1957.
Price $5.00. AAAS Members' cash order price $4.50.

**Psychopharmacology**
6" x 9", 175 pp., bibliographies, index, cloth, 1956. Price $3.50.
AAAS Members' cash order price $3.00.

**Alcoholism—Basic Aspects and Treatment**
6" x 9", 220 pp., 33 illus., references, index, cloth, May 1957.
Price $5.75. AAAS Members' cash order price $5.00.

**AAAS Publications**
1515 Mass. Ave., NW, Washington 5, D.C.

---

**Radio-frequency Voltmeter** covers up to six ranges, switch controlled, between 1 v and 300 v full scale in any one instrument. Frequency range is d-c and from 7 cy to 5 Mcy/sec in the 1-v range and to 150 kcy/sec in the 300-v range. Response is true r.m.s. when a thermocouple and D'Arsonval movement are used. Resistance is 200 ohm/v. Accuracy is 0.5 percent of full scale over the frequency ranges indicated. (Sensitive Research Instrument Corp., Dept. 572)

**Sound Source** is a small, self-contained acoustic calibrator for sound measuring systems. Sound at a level of 108 db is generated for 14 sec by means of 14,000 1-mm precision steel balls striking against a metal diaphragm. Each source is calibrated in terms of its r.m.s. value with accuracy ± 1 db. The effect of temperature on calibration is less than 0.5 db over the range 32° to 160° F. (B & K Instruments, Dept. 577)

**Current Probe** is designed to permit measurement of radio-frequency interference without direct connection to the product being tested. The probe is a current transformer designed to couple radio-frequency noise into a calibrated receiver of 50-ohm input impedance. Current in the primary is read in terms of secondary voltage. The probe is insulated for 600 v. (Stoddart Aircraft Radio Co., Dept. 576)

**Tube Furnace** operates at temperatures up to 3000°F. Single- and double-ended types in three sizes are available. The molybdenum heating elements are protected by an atmosphere of hydrogen or dissociated ammonia. A transformer control system permits safe cold starting and provides continuously variable temperature control. (Hevi-Duty Electric Co., Dept. 581)

**Vibrating-reed Capacitor** converts direct current into sinusoidal alternating current for amplification. Measurements of current as low as 10⁻¹⁸ amp is permitted by the device. Maximum contact potential is 20 mv, and contact-potential drift is within ± 0.2 mv/day. Drive frequency is 500 cy/sec, self-stabilized. Static capacitance is 10 pf. (Stevens-Arnold Inc., Dept. 582)

**Joshua Stern**
National Bureau of Standards

---

In this issue, an instrument, which operates on the basis of thermal conductivity, can be calibrated for any gas over either narrow or wide ranges of concentration. Accuracy is within ± 2 percent of full scale. Sample requirement is 10² to 10³ cm³/min. Time for 90-percent response is 60 sec. Zero drift over a 30-day period is negligible. (Mine Safety Appliances Co., Dept. 569)
Now, Kimble offers KIMAX (Made from hard borosilicate glass)...

...laboratory glassware that shrugs off heat shock and chemical attack

New KIMAX "hard" glass apparatus offers exceptional resistance to heat shock, mechanical shock and chemical attack. And it's easy to repair and modify... can be sealed to your present borosilicate apparatus.

24005 EXTRICATION APPARATUS. Condenser jackets and exterior bodies are made of heavy, uniform tubing for greater strength. In new design vapor by-pass channel protects siphon tube. Interchangeable with other makes. In 30, 38, 50mm sizes.

25055 BOILING FLASK. Made to withstand severe thermal shock. Finely ground joints provide vapor-tight fit when used with extraction apparatus. Flat bottom adds stability. In 125, 250, and 500 ml capacities.

16040 CONNECTING BULB. Lower tube fits special Kjeldahl stopper. Inside tips designed for unrestricted counterflow of liquids and vapors. Glazed tips and uniform tubing provide extra strength. Two bulb sizes, 45 and 55mm.

26505 ERLENMEYER FLASK. First to be made available with screw-cap finish. Useful for mixing and storing culture media and for many chemical purposes. Supplied with caps. Available in 125, 250, 500, and 1000 ml capacities.

29048 SEPARATORY FUNNEL. Large neck openings and sloping shoulders permit easy cleaning. Stems are sized to permit liquid column to break and drain after shut-off. Stopper hand-lapped to neck for leak-proof fit. In 60, 125, 250, 500, 1000 ml capacities.

27400 KJELDAHL FLASK. Necks tooled to insure accurate stopper fit. Reinforcing beads at top and uniform walls minimize breakage. Chemical resistance of KG-33 glass greatly reduces etching. Seven sizes, from 10 ml capacity to 800 ml.

KIMAX enables Kimble to offer greater savings because of its more complete line. Ask your dealer about quantity discounts. Kimble Glass Company, your most complete source of laboratory glassware, is a subsidiary of Owens-Illinois, Toledo 1, Ohio.

KIMBLE LABORATORY GLASSWARE
AN 1 PRODUCT

OWENS-IllINoIS
GENERAL OFFICES • TOLEDO 1, OHIO

Science is published weekly by the AAAS, 1515 Massachusetts Ave., NW, 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¢.
Letters

Leukemia and Radiation

Brues article “Critique of the linear theory of carcinogenesis” (Science 128, 693 (1958)) is an admirable and highly critical review which deals particularly with the relationship of human leukogenesis to ionizing radiation. Many good points are made indicating that there may be a nonlinear relationship of radiation dose to leukemic end result. In the end, however, one is faced with the usual difficulty of trying to assess which of the different interpretations derived from the same sets of data is correct. Brues would be the first to admit, I am sure, that his interpretations, however well reasoned, may be as far from the mark as the next man's.

The statement is made (page 694) that “this steady increase [in incidence of leukemia in the United States] has been loosely attributed to an increase in human irradiation (17)” (italics mine). The reference is to an editorial of mine written in 1947 “Is leukemia increasing?” Blood 2, 101 (1947) in which some comment is made upon an article by Sacks and Seeman appearing in the same issue. Various possibilities for the apparent increase in incidence of leukemia are discussed, including those of radiation and chemical exposure. Indeed, most emphasis is placed upon various forms of chemical exposure and their possible leukemogenic effects. There is no mention (in this editorial) of “an increase in human radiation” as Brues rather “loosely” states. However, the prophetic statement is made, shortly after the event and before any cases of leukemia were described, that “it will be of interest to observe the Japanese survivors of the atomic bomb for future indications of proliferative disease of the white cells.”

Brues may have reference to another editorial published more recently [W. Dameshek and F. W. Gunz, J. Am. Med. Assoc. 183, 838 (1957)] in which the suggestion was broached that the apparent increase in incidence of leukemia may be due, at least in some measure, to the increasing exposures of affluent populations to diagnostic and therapeutic x-radiation. Although some of the conclusions were admittedly speculative, it seemed fitting in this editorial to emphasize the potential dangers of radiation therapy for nonneoplastic disease and of unnecessary and frequently repeated diagnostic x-ray procedures.

In our recent book Leukemia [W. Dameshek and F. W. Gunz (Grune and Stratton, New York, 1958)] Gunz and I discuss the matter of leukogenesis and ionizing radiation at length and conclude from all the available data that only about 15 percent of the cases of leukemia can reasonably be ascribed to radiation and that there are other etiologic agents such as chemical exposure and heredity which it is just as important to emphasize. It may well be that the various leukemogenic agents that have been discussed (ionizing radiation, carcinogenic chemicals, viruses, heredity) act by inducing a modification or “deletion” of certain cellular enzymes, thus leading to an altered type of growth pattern for a certain number of cells, depending upon (i) the dose and (ii) the tissue. The leucocytic tissues, already “generalized,” will respond in a generalized—that is, leukemic—fashion. However, it is also possible that a very small clone of abnormal cells may develop which is insufficient to do much damage or may indeed be overwhelmed.

Brues article, which is a model for a critical review, is well worth reading and carefully digesting.

William Dameshek
Blood Research Laboratory,
New England Center Hospital,
Boston, Massachusetts

My blunder in attributing this view to Dameshek is the sort of thing that is the nightmare of anyone who prepares an extensive bibliography. While others have loosely attributed to radiation many things which are changing or thought to be changing, he is not one of them. I apologize particularly because he has maintained and voiced a balanced and reasonable view of the whole problem.

Austin M. Brues
Division of Biological and Medical Research, Argonne National Laboratory,
Lemont, Illinois

Excessive Education Department Requirements

Recently I wrote a letter to Science [128, 1156 (1958)] mentioning, among other things, the excessive education department requirements for science teacher certification. It was implicit in the discussion that university science departments had produced thousands of fine science teachers who are barred from secondary-school teaching positions in most states because they would not spend a fifth to a quarter or more of their university time taking education department courses.

Subsequently, the 85th Congress passed Public Law 85-864, which by its own terms may be cited as the National Defense Education Act of 1958. Certain provisions of this act create concrete financial difficulties for student borrowers because of the excessive education department requirements.
Beginning February 11th on CONTINENTAL CLASSROOM:

A COLLEGE-ACCREDITED TELEVISION COURSE IN

Atomic and Nuclear Physics

If you'd like to learn more about atomic and nuclear physics . . . if you're working towards an advanced degree . . . call your NBC-TV station now for full information. More than 250 colleges and universities are now accepting registrations for audit or credit.

Course will provide:
Technical knowledge of atomic and nuclear physics—with demonstrations, experiments, and special lectures on new developments by Nobel Prize winners and other distinguished physicists.

Conducted by:
Dr. Harvey E. White, vice chairman of the physics department at the University of California, consultant to the Atomic Energy Commission, and author of the most widely used college text on physics.

College credits:
More than 250 colleges and universities are cooperating with the American Association of Colleges for Teacher Education to accept enrollments of, provide examinations for, and assign credits to any TV students who satisfactorily complete the course. Tuition will be set by each institution. Call your NBC-TV station for details.

Televised coast to coast:
Over 150 commercial and educational stations, in conjunction with NBC-TV, will present this course, 1/2-hour each weekday, from February 11th to June 5th. Check local TV listings for time and channel of CONTINENTAL CLASSROOM. The first semester, now in session, can show you how the course is conducted. Why not tune in tomorrow?

U.S. STEEL proudly joins the Ford Foundation, the Fund for the Advancement of Education, and five other corporations in financing this splendid program—and in urging you to enroll. Call your NBC-TV station now for more information.
Title II of the act provides for student loans of up to $5000, and in section 205 (b) (3) provides for cancellation of the obligation to repay up to 50 percent of the loan as a reward for specified time spent in teaching in public elementary or secondary schools. Thus, a student borrower who after graduation goes into teaching is entitled to what amounts to a bonus of up to $2500. Yet regardless of the fact that a science department believes the man well qualified to teach science, he must also satisfy the education course requirements, which have been lobbied into the regulations in most states. The student who won't give time to all the required education department courses is penalized up to $2500, and his services are lost to the public-school system. The student who must heed the $2500 bonus provision must spend time on education department courses which might be better spent on solid subject matter courses. The Defense Education Act thus becomes in effect a force feeder for the already disproportionately large education departments.

It seems more important than ever that scientists and science departments rather than educationists should prescribe the qualifications for science teachers—that a science department teaching recommendation be admitted in lieu of an arbitrary number of education courses for teacher certification. The American Association for the Advancement of Science can properly advise state regulatory bodies that the quality of teaching will be improved, not lowered, by elimination of all education department courses not deemed necessary by the science department to fit each individual case.

WILLIAM W. PORTER II
Los Angeles, California

Scientific Communication

A recent editorial [Science 127, 1145 (1958)] and a letter by D. Lebo [Science 128, 424 (1958)] have called attention to increasingly critical problems of scientific communication. Some attributes of an improved communication system are (i) capability of evolving from the existing system; (ii) reduction of delays in communicating results; (iii) coverage of a broad range of scientific interests (reversal of the trend toward overspecialized journals); (iv) guarantee of self-determination to the individual author (elimination of editor-referee censorial power and of pressure toward source-material abridgment); (v) guarantee of self-determination to the individual subscriber (elimination of unwanted material from his mail, unlimited availability of wanted material); (vi) incurrence of no added cost.

The following hypothetical system illustrates the possibility of reconciling these apparently divergent requirements. The contributor prepares a full account of his research, sparing no detail. He also prepares an abridgment of perhaps two pages and a conventional abstract. The full account receives an identification number and is permanently filed in a central repository. The abridgment is printed, with its number, in a bound journal resembling (except for its broader scope) the appropriate existing journal. Thus, the necessary evolutionary link with the present system is provided. The abstract is not, as now, attached to the article but is printed, with identification number, on a separate card.

The journal subscriber receives with each issue the corresponding stack of abstract cards (optionally he might wish to receive only the cards). These may advantageously be border-punched cards [G. Cohn, J. Franklin Inst. 266, 133 (1958)], partially prepunched to provide rough classification assistance. Most of the border holes are left unpunched, to allow the subscriber to apply his own information-retrieval methods and adapt his punching system to his personal needs and mnemonic habits. (The required tools are simple: a punch and a sorting needle. To retrieve abstracts in a given category, form cards into a deck in any order, pass the needle through the appropriate hole, spread and lift the deck; the punched cards fall out.)

By postcard, included with the abstract cards, subscribers request photocopies (or other facsimile reproductions) of those full accounts that interest them. If the latter prove scientifically exceptional, the volunteer "referees" have a professional obligation to communicate their suggestions to the authors. Profiting from such criticisms, authors may issue revisions to supersede their earlier accounts. The constructive aspects of the present refereeing system are thus retained and enhanced, since a maximum number of maximally interested referees are effectively consulted. The editor, too, plays a more constructive role. He can select for full publication articles worthy of general attention, or those for which the demand exceeds the resources of economical facsimile copying, but he suppresses nothing and delays nothing.

Subscribers might be entitled to annual allowances of facsimile material, extra requests being charged on a per-page basis. The reprint problem is solved automatically. Savings in type-setting costs resulting from the abridgment policy might offset the cost of abstract cards. It is hoped that these suggestions may encourage scientists to experiment with evolutionary improvement of traditional publication procedures.

T. E. PHIPPS, JR.
Falls Church, Virginia

SCIENCE, VOL. 129