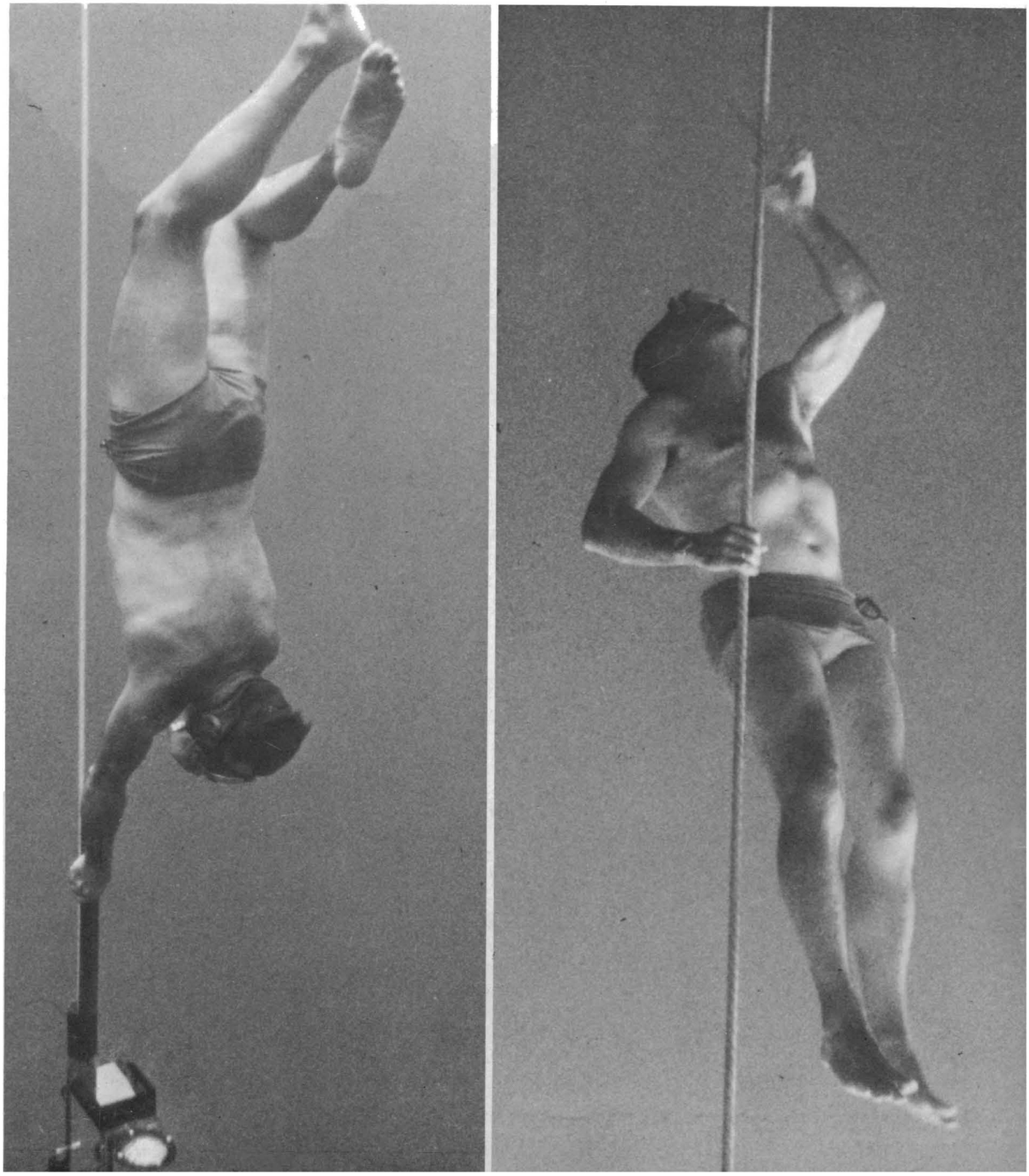
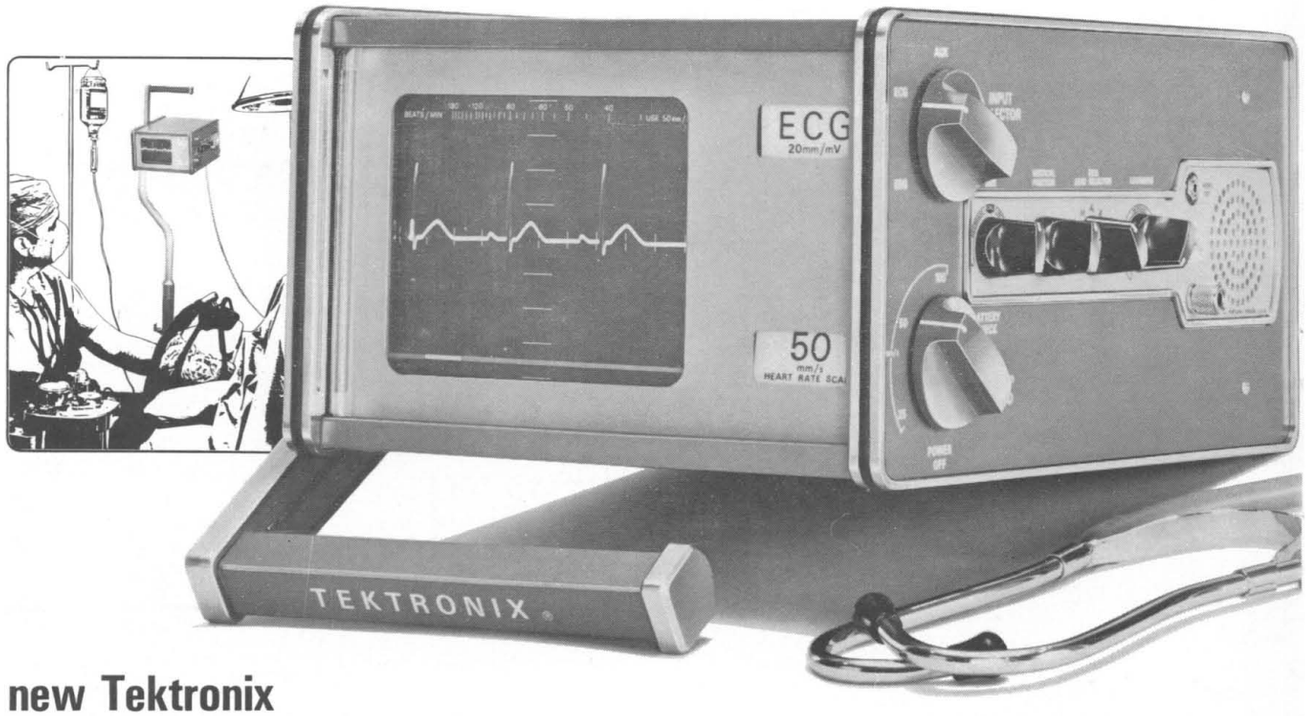
SCIENCE 29 November 1968
Vol. 162, No. 3857
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



small...
self powered...
easy to operate...



new Tektronix Type 410 physiological monitor

- **Battery or AC powered**
- **Clear displays of ECG, EEG or related waveforms on 5-inch screen**
- **Audible heartbeat monitor with automatic alarm**
- **Direct-reading heart rate scale**

The new Type 410 Physiological Monitor is a small, self-powered, portable instrument specially designed to monitor physiological signals in the operating room. Clear displays of ECG, EEG and other related waveforms can be viewed easily on its 5-inch (8 x 10 cm) screen.

Triggered sweep in the ECG mode always positions a QRS complex at the start of each sweep. This feature permits direct reading of the patient's heart rate on a scale scribed at the top of the viewing area. Heart rate can be determined at a glance by reading the number above the peak of the second QRS complex. (Photo shows 78 beats/min.) The Type 410 provides an audible tone at each heartbeat, with an automatic alarm if the ECG signal ceases. The alarm starts within 4 seconds after loss of signal. The sound level is adjustable and an earphone jack is provided for private listening.

Six clearly-marked controls are provided for easy operation of the Type 410. The INPUT SELECTOR determines the display mode (EEG, ECG or AUX input). THE SWEEP SPEED control turns the instrument on, permits selection of 25, 50 or 100 mm/s sweeps, and also serves as a BATTERY CHECK switch. The ECG Lead Selector provides selection of I, II, III, aV_R, aV_L, aV_F, and V leads. The remaining 3 controls adjust vertical position, vertical size and sound level.

The solid-state Type 410 is 5⅜" high, 9⅛" wide and 12⅞" long, including carrying handle. It weighs 12½ pounds, including batteries. The Type 410 "warms up" and is ready for use in less than 10 seconds. It can be operated continuously from self-contained batteries for up to 12 hours, providing isolation from power-line ground which minimizes conducted (ground loop) trace interference. AC operation and battery recharging is accomplished by simply plugging the instrument into an AC outlet. A six-pin output connector permits driving of external amplifiers or recorders.

Type 410 Physiological Monitor with Accessories $825
U.S. Sales Price FOB Beaverton, Oregon

For a demonstration or a complete brochure, contact your nearby Tektronix Field Engineer or write: Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005.

A network of field service centers *... part of the Tektronix commitment to continuing customer service*

Mettler guide to the budget balance

Low cost, a fair consideration in any purchase, is only one of several compelling benefits resulting from Mettler's thoughtful re-design of its classic substitution balance.

Mettler's objective was to produce five new weighing instruments providing the ultimate in balance performance for the user, whether he be researcher or technician or student. To this end, Mettler applied the latest in design, manufacturing and human engineering concepts.

SIMPLICITY IS THE KEY

Mettler began by simplifying the balance mechanism.

- Individual molded parts were substituted for multi-part assemblies.
- Mettler's exclusive concentric ring weights were used, cutting in half the number of weights needed.
- Optical and mechanical control systems were simplified by placing them at the operator's eye level.

From this re-design comes better balances that are faster and easier to make . . . and they cost considerably less than the instruments they replace.

IMPROVED PERFORMANCE, NEW CAPACITIES

The five new balances range from an economical student model through standard analytical models to a semi-micro balance. All have capacities of 160 grams or greater.

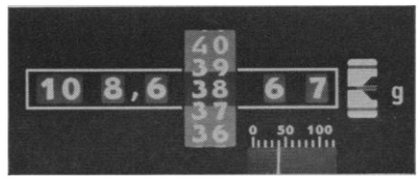
Their new beam designs and pan brakes make them far more stable and permit faster weighings than conventional balances.

Their precision-to-capacity relationships are exceptional. The Model H20, for example, combines the 160.1-gram capacity of an analytical balance with the ±0.01 mg precision of a semi-micro instrument.

READING DIGITS IS EASIER

The new Mettlers are available with either digital or vernier readout of weighing data.

Vernier reading costs less and sometimes is preferred by those who want to read that last numeral without adjusting a digital control knob. Digital readout is preferred by most users because of its speed and convenience. Human factors research has shown digital readout to be twice as fast and three times as accurate as reading dials or scales.



Clear, aligned digital readout

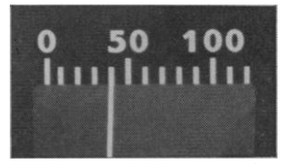
Mettler's digital readout has all numerals grouped and clearly aligned. Even an inexperienced technician or student can obtain highest levels of accuracy in weighing after only a few minutes of instruction.

All controls are clearly labeled and the readout has directional indicators, arrows on the readout panel to tell which way to dial the weight set.

PRE-WEIGHING UNLIMITED

One balance, the Mettler H10W, is equipped with an advanced pre-weighing feature. Pre-weighing gives an immediate indication of approximate weight with no intermediate dialing step. The new Mettler pre-weighing feature operates over the full range of the balance, avoiding the delay of a second dialing step if the sample exceeds 100 grams.

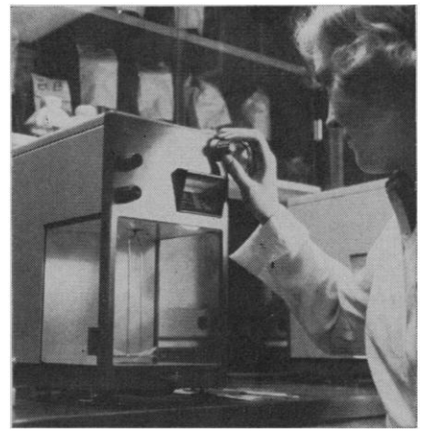
Instrument	Capacity	Precision	Readout
H8 Semi-analytical	160 grams	±0.3 mg	Vernier
H10 Analytical	161 grams	±0.05 mg	Digital
H10W Analytical pre-weighing	161 grams	±0.05 mg	Digital
H18 Analytical	160.1 grams	±0.03 mg	Vernier
H20 Semi-micro	160.1 grams	±0.01 mg	Digital



High-speed filling guide

ONCE AGAIN, WITH FILLING

All five have the exclusive Mettler filling guide. This lets you do one of the most common and time-consuming weighing jobs—filling to a target weight—in less than half the usual time. There are no repeated interruptions to the work. You proceed in orderly manner, filling to within the last few milligrams.



OPTICAL RANGE TARING

Taring across the optical range enables you to return the balance scale to zero to compensate for odd or fractional weights of the container. It goes a long way toward eliminating arithmetic calculations from the weighing operation.

BELOW-BALANCE ACCESSORY

Weighing objects below the balance, as in specific gravity measurements, is a simple job with the new Mettlers. An accessory kit which attaches directly to the balance pan provides the means.

TRY ONE NOW

Call any major laboratory supply dealer. Or write us for descriptive literature. We are Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

Mettler®

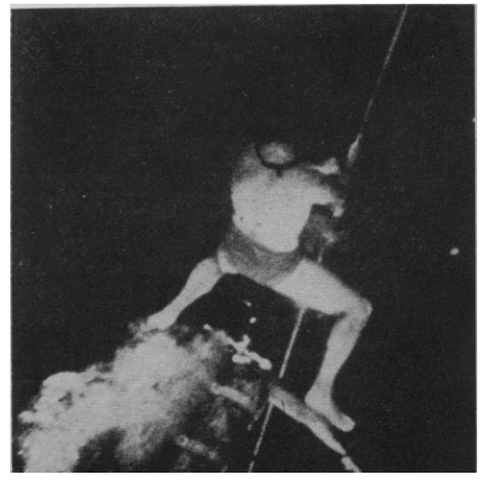
29 November 1968
Vol. 162, No. 3857

SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C. Annual subscriptions $12; foreign postage: Americas $3; overseas $5; single copies, 50¢ (back issues, $1) except **Guide to Scientific Instruments**, which is $2. School year subscriptions: 9 months, $9; 10 months, $10. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER Practice dive and ascent preparatory to actual 240-foot breathhold dive (see below). The world record dive was made by R. A. Croft, 12 August 1968. The diver wore special underwater contact lenses and saline-filled goggles. Total dive time was 2 minutes, 28 seconds. See page 1020. [Al Giddings, Bob Hollis, and Dewey Bergman, San Francisco, California]



The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

ADVANCE REGISTRATION FORM

Mail to: American Association for the Advancement of Science, Dept. R, 1515 Massachusetts Ave., NW, Washington, D.C. 20005

(Advance Registration accepted only until 29 November)

☐ Enclosed is $10 Registration Fee (*Program* and Convention Badge)

☐ Enclosed is $15 Registration Fee (including spouse) (*Program* and Convention Badges)

☐ Enclosed is $5 Student Registration Fee (16 years and older) (*Program* and Convention Badge)

☐ Enclosed is $5 for the *Program* only (To be mailed 1 December)

☐ Enclosed is $..... for tours

PLEASE PRINT OR TYPE

AAAS Member Yes ☐ No ☐

NAME: _____
(Last) (First) (Middle Initial)

MULTIPLE REGISTRATION: _____
(List student's full name. Attach list if space is insufficient.)

MAILING ADDRESS: _____
(For receipt of *Program*) (Street) (City/State) (Zip Code)

INSTITUTION OR
COMPANY AFFILIATION: _____

_____
(City) (State) (Zip Code)

FIELD OF INTEREST: _____

CONVENTION ADDRESS: _____

APPLICATION FOR HOTEL RESERVATIONS

Please print or type and mail to: **AAAS Housing, Dallas Convention Bureau, 1507 Pacific Avenue, Dallas, Texas 75201**

(Reservations received after 13 December cannot be assured.)

CHOICE OF HOTEL: First_____ Second_____ Third_____

ROOM: ☐ Single ☐ Double ☐ Twin ☐ Suite Preferred rate $_____

Number in party_____ sharing this room will be (list name and address of each person, including your own):

_____

_____

ARRIVAL: Date_____; _____AM, _____PM

DEPARTURE: Date_____; _____AM, _____PM

Be sure to list definite arrival and departure date and time. Hotel reservations will be held *only* until 6 PM unless otherwise specified.

NAME:_____
(Individual requesting reservation)

ADDRESS:_____
(Street) (City and State) (Zip Code)

Tours at the AAAS Annual Meeting

The AAAS is pleased to offer tours to institutions of particular scientific interest for registrants at the Association's annual meeting. Personally conducted tours arranged by officials of each institution will afford the visitor a unique opportunity to see special exhibits, displays, behind-the-scenes operations, and scientific activities of various kinds which are not usually seen by the general public. Attendance at each site is necessarily limited in order to give the visitor full opportunity to see and hear about work in progress. At some locations refreshments will be served by the host institution. Details on the special attractions at each site will be published in later issues of *Science*.

Chartered buses will provide round-trip transportation from the Statler-Hilton Hotel. Afternoon tours will return to the Statler-Hilton Hotel no later than 6 p.m. Ticket sales are limited to registrants. A fee of *$2.00 per person* is charged for each tour to cover transportation costs. Your ticket is your receipt and is required for transportation and admission. Tickets will be mailed with the *Program* and convention badge. Advance registration for tours will not be accepted after 29 November. Tickets for spaces unsold by 29 November will be on sale at the AAAS Tours desk in the registration area at the Statler-Hilton Hotel, starting 26 December.

Please use the form to register for tours. Indicate the number of tickets you wish to order for each tour and enclose payment of $2.00 for each ticket ordered.

Since attendance at each site is limited, early registration is recommended. Refund requests on tour tickets cannot be accepted after 18 December.

AAAS Tour Registration

Price of tickets is $2.00 each

Number of tickets	
.....	Texas Instruments, Inc., 27 December, 9:00 a.m.–noon
.....	Ling-Temco-Vought, Inc., 27 December, 2:00–5:00 p.m.
.....	Callier Hearing and Speech Center, 28 December, 10:00 a.m.–noon
.....	Amon Carter Museum, Fort Worth, 28 December, 1:00–5:00 p.m.
.....	Dallas Museum of Fine Arts, 29 December, 1:00–4:00 p.m.
.....	Ling-Temco-Vought, Inc., 30 December, 9:00 a.m.–noon
.....	Texas Instruments, Inc., 30 December, 2:00–5:00 p.m.
.....	Southwest Center for Advanced Studies, 30 December, 2:00–5:00 p.m.

Total number of tickets ..... Total amount remitted for tours $.....

Please indicate on reverse side total amount remitted for tours.

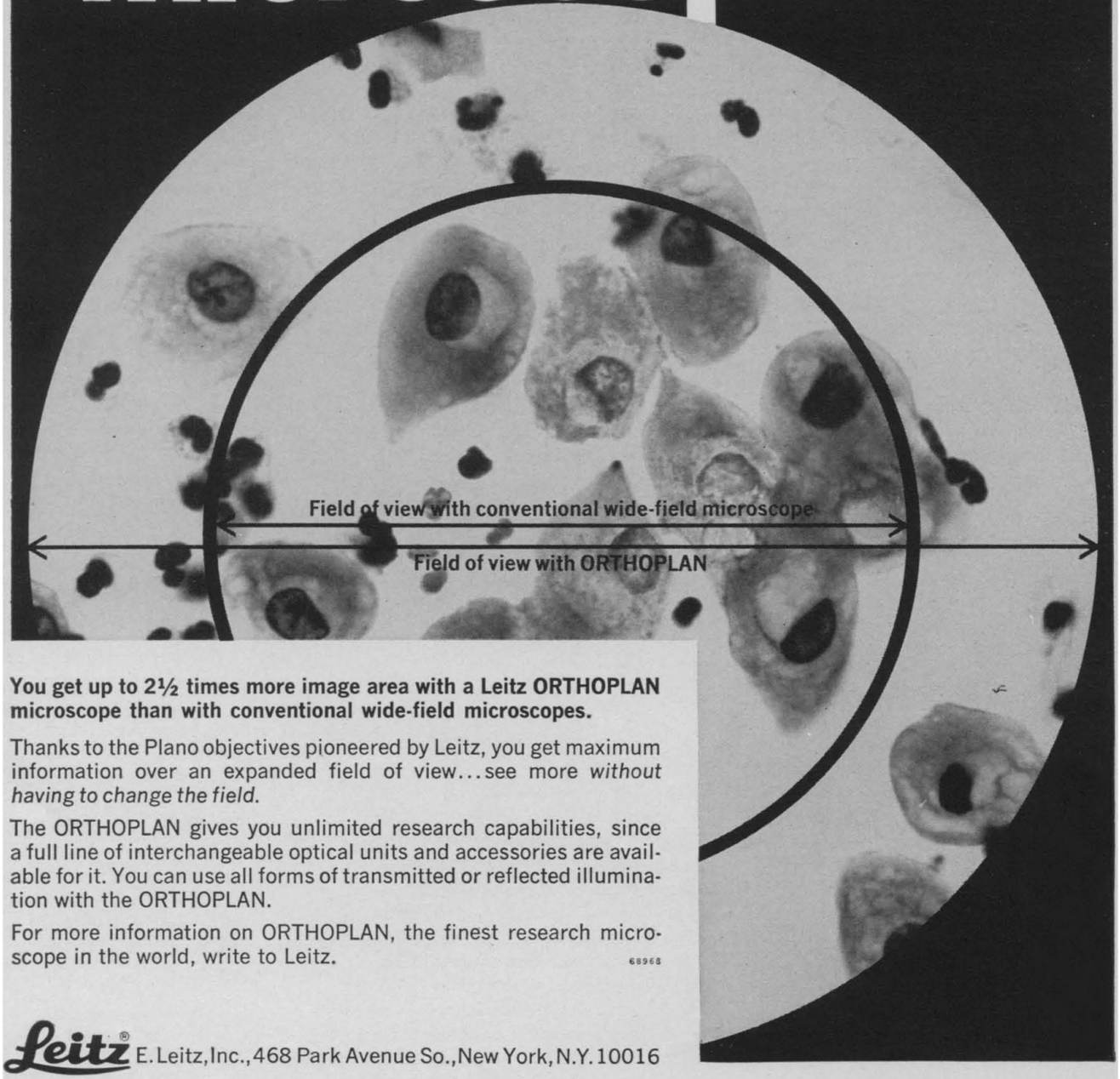
The American Association for the Advancement of Science will hold its 1968 Annual Meeting in Dallas, Texas, 26–31 December. The Adolphus (1321 Commerce), Baker (1400 Commerce), Sheraton-Dallas (Southland Center), and Statler-Hilton (1914 Commerce) hotels will be used for housing. All the hotels will have Registration Centers.

HOTEL RATES* (Per Day)

HOTEL	SINGLE	DOUBLE	TWIN	SUITES†	PARKING
Adolphus	$10–14	$14–17	$15–18	$35–up	Free
Baker	11–17	14–20	16.50–20	32–75	Free
Sheraton-Dallas	13	18	18	42–61	$1.50
Statler-Hilton	13	18	18	36.50–76	Free

*All rooms are subject to a 3% city transient room tax. † Rates for suites, parlor and one- to three-bedroom. There is a charge of $4.00 for cots.

The picture-window microscope



You get up to 2½ times more image area with a Leitz ORTHOPLAN microscope than with conventional wide-field microscopes.

Thanks to the Plano objectives pioneered by Leitz, you get maximum information over an expanded field of view... see more *without having to change the field.*

The ORTHOPLAN gives you unlimited research capabilities, since a full line of interchangeable optical units and accessories are available for it. You can use all forms of transmitted or reflected illumination with the ORTHOPLAN.

For more information on ORTHOPLAN, the finest research microscope in the world, write to Leitz. 68968

Leitz® E. Leitz, Inc., 468 Park Avenue So., New York, N.Y. 10016

29 November 1968, Volume 162, Number 3857 SCIENCE

The University President

The typical president of an American university or liberal arts college is a 55-year-old man with an earned doctoral degree and substantial experience as a professor. He has held office for 6 years and has another 5 years to go to equal the tenure of his immediate predecessor. He serves as the institution's principal representative to the public, as its internal educational leader, as an officer burdened with too much routine and trivia, and as the member of the academic community most often called on for a variety of kinds of public service. He is the most overworked man on the campus and occupies the most exposed position. Students, faculty, trustees, alumni, friends, and critics are all plural. But he stands alone. For his services he is paid 82 percent more than the average full professor on the same campus, is given an expense account for official entertainment which he must supplement from his own pocket, and he and his family share with official visitors and a variety of supplicants a goldfish bowl known as the President's House.

This description is drawn from a nationwide study of the compensation and working conditions of the presidents and other administrative officers of American colleges and universities* conducted by Mark H. Ingraham, who has not been a president himself but who has observed many from the viewpoints of a professor, a dean, and a long-time pillar and one-time president of the American Association of University Professors.

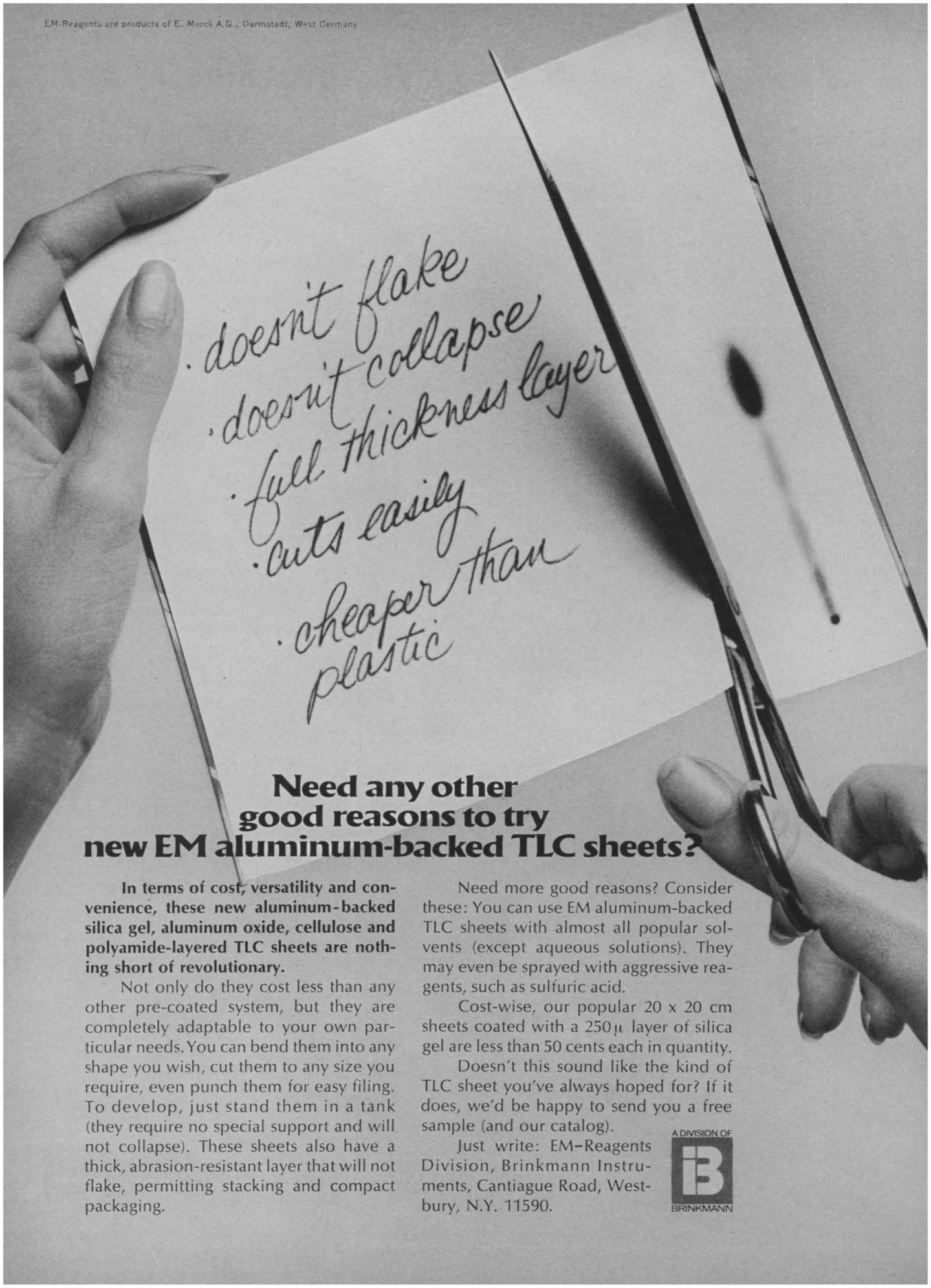
How should the current description be changed? Professor Ingraham makes several financial recommendations. Most presidents are not paid enough, but neither are the top professors; the whole salary scale has become so compressed as to decrease "the emphasis on quality which is greatly needed." Some improvement is needed in retirement funding provisions. And many presidents need better working conditions and more and better assistants, and should be encouraged to get them, for too often they have stinted themselves to use available funds elsewhere on the campus.

Ingraham also makes some recommendations that are not primarily financial. Presidents need to get away from their responsibilities more frequently and for longer periods. Vacation and leave provisions are much less generous for presidents than for faculty members, and are far from fully utilized. In the year reported, 18 percent took no vacation and 52 percent took 3 weeks or less. Leave of absence—the equivalent of a professor's sabbatical or leave for research or professional purposes—averaged only 3 days a year. The president's year does not include the breaks and the changes of pace and activity of the teaching and research faculty. His need is therefore perhaps greater than that of the professor for vacations and for occasional leave for study, travel, and intellectual refreshment.

In an institution in which authority and responsibility are as widely shared as they are in a university or college, each participant is likely to overestimate the advantages and underestimate the difficulties faced by other participants in the enterprise. Better understanding and communication of the facts has therefore been one of Ingraham's objectives. In 1965 he supplied the academic community with the definitive account of faculty benefits, other than salary.† The new volume gives faculty members an opportunity to understand better some of the working conditions, the frustrations, and the compensations of their presidents and other administrative officers.—DAEL WOLFLE

* M. H. Ingraham, *The Mirror of Brass* (University of Wisconsin Press, Madison, 1968).
† M. H. Ingraham, *The Outer Fringe* (University of Wisconsin Press, Madison, 1965).

EM-Reagents are products of E. Merck A.G., Darmstadt, West Germany



Need any other good reasons to try new EM aluminum-backed TLC sheets?

In terms of cost, versatility and convenience, these new aluminum-backed silica gel, aluminum oxide, cellulose and polyamide-layered TLC sheets are nothing short of revolutionary.

Not only do they cost less than any other pre-coated system, but they are completely adaptable to your own particular needs. You can bend them into any shape you wish, cut them to any size you require, even punch them for easy filing. To develop, just stand them in a tank (they require no special support and will not collapse). These sheets also have a thick, abrasion-resistant layer that will not flake, permitting stacking and compact packaging.

Need more good reasons? Consider these: You can use EM aluminum-backed TLC sheets with almost all popular solvents (except aqueous solutions). They may even be sprayed with aggressive reagents, such as sulfuric acid.

Cost-wise, our popular 20 x 20 cm sheets coated with a 250 μ layer of silica gel are less than 50 cents each in quantity.

Doesn't this sound like the kind of TLC sheet you've always hoped for? If it does, we'd be happy to send you a free sample (and our catalog).

Just write: EM–Reagents Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. 11590.

A DIVISION OF
BRINKMANN

aggregated into complicated networks. Cervical mucus contains an iron-binding protein "lactoferrin" which is present in many external secretions and seminal plasma, but absent in blood serum, concentrated follicular fluid, amniotic fluid, and the placenta. Lactoferrin seems to protect the mucosa against damage by heavy metals and bacterial infections and perhaps plays a role in sperm capacitation.

The diagnosis of zygosity of offspring is based on sex, structure of placental membranes, and the enzyme systems of the blood and placenta. A monochorial placenta may be considered certain proof of monozygosity. Of particular interest are the relatively great number of cardiac malformations and the hemodynamic aspects of different types of placental anastomosis.

The intrauterine device may cause distention of the uterine lumen and impair the tonicity of the myometrium; this interferes with implantation of the blastocyst. The incorporation of a progestin, melengestrol acetate, in silastic intrauterine devices causes prolonged retention of the devices in the uteri of rats and rabbits, which usually expel identical devices without added progestin. The development of a hormone-releasing device which acts mainly on the uterus, can be retained longer, and suppresses bleeding might broaden the usefulness of this contraceptive method in man.

The condom and the spermicidal vaginal contraceptive methods still used in several countries lessen sexual pleasure and may leak or rupture during intercourse. In Japan a soluble condom containing the spermicidal compound is kept in aluminum foil to prevent drying and is applied to the glans penis before intercourse.

An effort must be made to define the impact of contraceptives on general health and metabolic and endocrine functions. Current methods of data collection have failed to provide an adequate basis for statistical evaluation. Epidemiological surveillance is important, but to be valid the reporting of adverse reactions must be complete and unbiased. Collection and correlation of data is a task for national and international health agencies. Information on fertility and the health of children born to mothers previously treated with oral contraceptives should be collected systematically on an international scale.

Habitual abortion may be due to cervical incompetence, or an underdeveloped or overdeveloped uterus.

Patients treated during pregnancy with long-acting progestins show menstrual disorders which may vary from amenorrhea to menometrorrhagias after delivery. Aging of the ova, which results in embryonic death, may include chronologic aging of ovarian eggs, or intrafollicular or intraoviductal overripeness of eggs. Infants of young fathers suffer high stillbirth rates, but not high rates of childhood mortality.

Several methods are used to make pregnancy possible in cases of oviductal occlusions: implantation of the ovary into uterine cornua, formation of an oviduct from neighboring tissues, implantation of an intact oviduct from another woman, transfer of fertilized ova into the uterine lumen, and insertion of an artificial oviduct.

Several chemical criteria are used to evaluate the condition of human semen: sperm nucleic acid is related to male fertility; acid and alkaline phosphatases are related to prostatic function; fructose is related to the function of the seminal vesicles; and the electrophoretic pattern of normal and pathological seminal proteins is diagnostic. There are other analytical methods for diagnosing ejaculatory disturbances and certain anatomical defects such as absence of vasa deferentia or occlusion of ejaculatory ducts.

Congenital malformations account for a high percentage of child morbidity and mortality. Repair of congenital malformations is spectacular, desirable, and necessary. Planned prevention of malformations is still in its beginning stages, and eugenic prophylactic measures are very limited. Many apparently viable and normal embryos and fetuses die because of adverse maternal or environmental factors and are eliminated by spontaneous abortion. Certain malformations of the cardiovascular system are incompatible with prenatal life, but are well tolerated in postnatal life. On the other hand, many malformations of the brain, eye, and extremities are well tolerated in prenatal life, but become pathogenic after birth. Metabolic disturbances like phenylketonuria and galactosemia are tolerated *in utero*, but become disastrous after birth.

The amniotic fluid is obtained (amniocentesis) for antenatal diagnosis of fetal disorders, such as *Rh* incompatibility. After delivery of congenitally malformed babies, further pregnancies can be examined by amniocentesis and chromosomal analysis of fetal cells. Amniocentesis may play an important role in genetic counseling.

Recent advances in genetics and developmental biology make it possible to influence specific characteristics of the offspring: control of sex, mastery of genetic disease, propagation of specific genotypes, or establishing the biological basis for specialized skills. Knowledge of deoxyribonucleic acid biochemistry has been applied to specific developmental situations.

The diagnosis of fetal sex chromatin may be useful for antenatal care in cases of sex-linked hereditary disorders. Makamo and de Watteville examined the fetal membrane of 8184 infants to determine the nuclear sex. Sex chromosomal anomalies occurred in 0.13 percent of the cases. The incidence of XXY, XXX, and XO in newborns is estimated to be 1/750 in males, 1/1000 in females, and 1/3000 in females, respectively.

At the congress a new organization was formed, the International Federation on Fertility Associations, an outgrowth of the International Fertility Association. P. H. de Watteville (Switzerland) has been elected to head the new federation.

E. S. E. HAFEZ
Washington State University, Pullman

Fermentation Industries: Promising Future Predicted

A promising future for the fermentation industries was forecast by C. G. Heden (Karolinska Institute, Stockholm) and A. F. Langlykke (Rutgers University) at the Third International Fermentation Symposium held at Rutgers University (2–6 September 1968). The meeting was sponsored by the Division of Microbial Chemistry and Technology of the American Chemical Society, and the Fermentation Industries Section of the Applied Chemistry Division of the International Union of Pure and Applied Chemistry (IUPAC).

The theme of the Symposium "Fermentation Advances in the Light of Recent Theoretical Progress in Microbiology, Biochemistry and Engineering" was examined. Two major benefits derived from this symposium by the 800 participants (representing 20 countries) were the opportunity to hear reports of recent advances in fermentation technology and to hear of prospects for the immediate future of the fermentation industries.

New fermentation products and processes which might reach commercial-scale production in the near future were discussed. These included Monensin, an antibiotic with coccidiostatic properties, which is comparable in potency and has lower toxicity than many of the synthetic organic chemicals now used for this purpose; glucose isomerase, a streptomycete enzyme converting glucose to fructose, which is now used to prepare syrups for the confectionary trade; a new rennin-like enzyme from a fungal source found acceptable to replace the calf-stomach-derived enzyme used in cheese making and now in short supply; a new process for obtaining erythorbic acid (iso-ascorbic) by direct mold fermentation of glucose; a microbial conversion of pentaerythritol to tris (hydroxymethyl) acetic acid; a tartaric acid producing fermentation of glucose; and two new microbial products with insecticidal properties.

The microbial conversion of hydrocarbons to edible, useful protein was discussed in more than a dozen papers with emphasis on technology required for economic production of the microbial cells. The biological value of proteins and the varieties of useful hydrocarbons (including methane) were also discussed in detail. With the world sugar shortage on the horizon, *N*-paraffins were proposed as economically feasible substrates for fermentation processes producing the food supplements glutamic acid and ribonucleic acid.

Three discussion panels considered a diversity of problems which may affect the fermentation industries now and in the future. The possibilities of using enzymes to carry out useful transformations of steroids, antibiotics, and terpenes, as well as the utility of enzymes attached to fixed supports, attracted much attention. The panel discussion on patent protection of fermentation processes emphasized the differences in the various countries in the world and the limitations of preventing infringement. A group of tissue-culture experts presented information on tissue culture as a fermentation process for production of cells, enzymes, protein hormones, and steroid hormones.

The Fourth International Fermentation Symposium will be held in Tokyo, Japan, in 1972 under the sponsorship of the IUPAC and several Japanese fermentation societies. Information concerning this meeting may be obtained from Professor G. Terui, Osaka University, Osaka, Japan.

D. PERLMAN
School of Pharmacy, University of Wisconsin, Madison 53706