SCIENCE 27 December 1968
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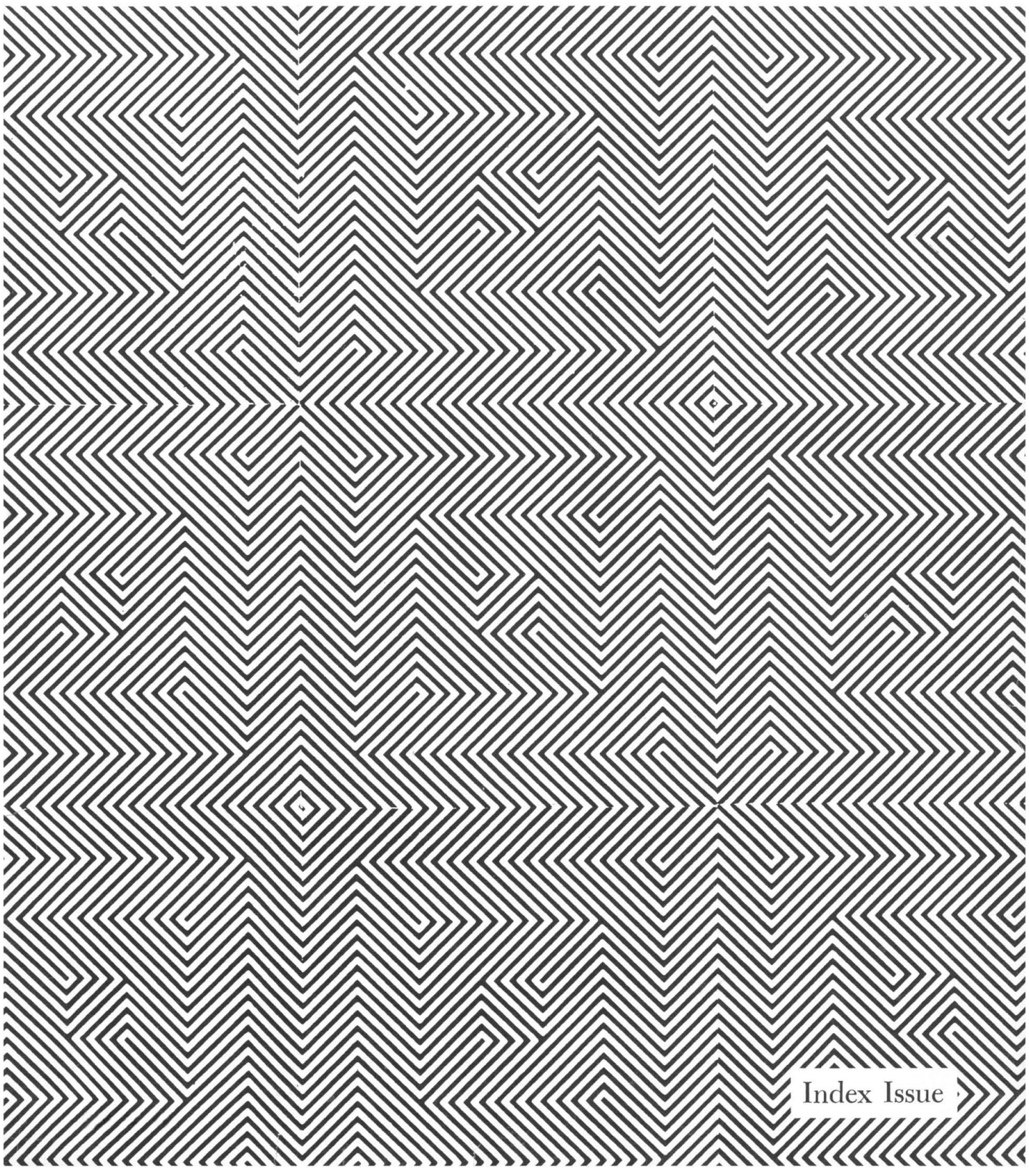
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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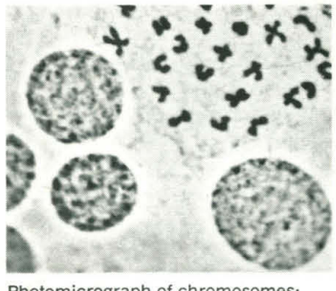

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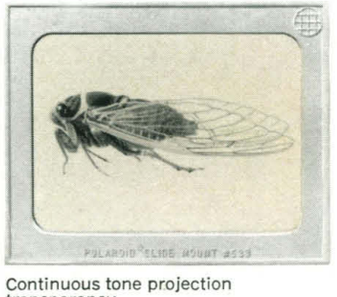
Macrophotograph of wing attachment.



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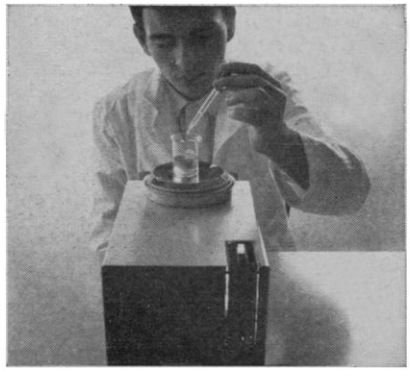
Weight Watching Has Never Been Easier

The Mettler P1200, a well established and versatile top-loading balance, now has digital readout. This feature permits even relatively unskilled operators to obtain accurate results without misinterpretation or reading errors.



The P1200 will tackle weighings to 1200 grams (plus 100-gram tare), and give you a precision of ±5 mg. That's better than one part in 250,000. But despite its capabilities for handling the bigger weighing jobs, the P1200 will also complete a weighing in just three seconds. It will also checkweigh to plus or minus values as fast as you can place an object on the scale, and without referring to scale readout. Powdery, granular or liquid substances can be filled rapidly by the use of a filling guide which shows the approximate weight on the pan throughout the entire weighing operation. This eliminates time-consuming interruptions for reading the balance.

Remove Grams — Positively

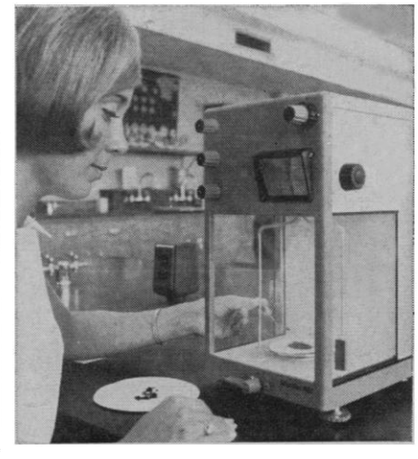
The P160, another top-loader, weighs unknowns to 160 grams with a precision of ±1 mg. In addition to having all the features of the P1200, it is ideally suited for weight loss studies. It has a reverse scale which gives a positive reading as weight decreases in drying, evaporation and residue determination studies. This feature eliminates time-consuming calculations and the possibility of arithmetical errors. It also simplifies gravimetric titrations (for more information on the advantages of gravimetric titrimetry, write for Bulletin M-1014A).

A Well-Balanced Balance

Slight changes in the balance level of the P1200 and the P160 (as in all Mettler top-loaders) are automatically compensated for by a zero point restoration feature. We call it Mettler Levelmatic. If your balance is out of plumb beyond its compensation range, you won't be able to make a weight reading because the readout is automatically obscured. Because Levelmatic automatically compensates for most shifts in zero position, it is rarely necessary to re-zero the balance before weighing.

Have Your Cake and Eat It

If you need an analytical balance to watch your weight, consider the Mettler H20 . . . it's really two balances in one. It gives you the 160.1-gram capacity of a macro-analytical balance, and the ±0.01 mg precision of a semi-micro instrument. The H20 readout, like the P1200 and P160, is digital. It also has a high-speed filling guide, and an optional accessory will let you weigh objects below the balance; for example, to make specific gravity measurements by weighing objects submerged in liquids. Because of the unrestricted optical taring feature of the H20, you can tare off the weight of your container in seconds, and begin weighing-in with readout at zero. You can't make a weighing mistake. If you're adding several components, you can dial back to zero for each one.



Some Food For Thought

In case you have a weighing requirement that can't be solved by one of these three balances, Mettler has 35 more models ranging from top-loaders that weigh to 13 kilos all the way through analyticals to ultra micro instruments with precision of ±0.1 μg. We'll bet a gram-cracker that one of these will fill the bill. To arrange for a free demonstration or trial, or for further particulars, write to Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

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27 December 1968
Vol. 162, No. 3861

SCIENCE

LETTERS

More on Amazonian Fauna: *C. W. Quaintance; M. Tsalickis; A. M. Fletcher;* Homology as Applied to Proteins: *W. P. Winter; K. A. Walsh, H. Neurath;* Regulation of Indirect Costs: *R. N. Faiman* 1432

EDITORIAL

Lee DuBridge 1435

ARTICLES

Temperatures of the Earth's Upper Atmosphere: *J. C. G. Walker* and *N. W. Spencer* 1437

Psychochemical Research Studies in Man: *A. J. Mandell* and *C. E. Spooner* 1442

Genotype, Environment, and Population Numbers: *F. J. Ayala* 1453

NEWS AND COMMENT

Nerve Gas: Dugway Accident Linked to Utah Sheep Kill 1460

Peace Research: SIPRI, in Sweden, Is Making a Role for Itself 1465

BOOK REVIEWS

Prelude to Riot, reviewed by *E. Liebow*; other reviews by *M. Lieberman, J. P. Boineau, J. B. Thompson, Jr., M. L. Moss, F. Ordway, C. W. Condit* 1467

REPORTS

Investigation of Horizon Beta: *C. C. Windisch* et al. 1473

Spores, Pollen, and Microplankton from the Horizon Beta Outcrop: *D. Habib* 1480

Pulsating Radio Sources near the Crab Nebula: *D. H. Staelin* and *E. C. Reifenstein III* 1481

Surface Structure of Polymers: Glancing-Angle Electron Diffraction Study of Polyethylene: *H. Schonhorn* and *J. Drobek* 1483

Inhibition of Cell Growth in vitro by Adenosine 3′,5′-Monophosphate. *W. L. Ryan* and *M. L. Heidrick* 1484

Virus-Like Particles in the Spiral Ganglion of the Guinea Pig Cochlea: *J. L. Craft* and *D. A. Hilding* 1485

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Photoregulation of an Enzymic Process by Means of a Light-Sensitive Ligand: *H. Kaufman, S. M. Vratsanos, B. F. Erlanger* 1487

Reactions of Aromatic and Sulfur Amino Acids in Ribonuclease with Hydrogen Atoms in Water Solution: *R. Shapira* and *G. Stein* 1489

Staphylococcal Nuclease: Size and Specificity of the Active Site: *P. Cuatrecasas, M. Wilchek, C. B. Anfinsen* 1491

Warfarin Treatment of Mice Bearing Autochthonous Tumors: Effect on Spontaneous Metastases: *J. J. Ryan, A. S. Ketcham, H. Wexler* 1493

Immunologic Enhancement of Tumor Xenografts by Pepsin-Degraded Immunoglobulin: *S. Broder* and *F. Whitehouse, Jr.* 1494

Sterol Precursors of Cholesterol in Adult Human Brain: *G. Galli, E. G. Paoletti, J. F. Weiss* 1495

Biologic Precipitation of Fluorite: *H. A. Lowenstam* and *D. McConnell* 1496

Amino Acid Composition of Organic Matrix in Calcareous Oolites: *R. M. Mitterer* .. 1498

Receptors Sensitive to Carbon Dioxide in Lungs of Chicken: *D. F. Peterson* and *M. R. Fedde* 1499

Separation of Cellular from Extracellular Controls of Drinking in Rats by Frontal Brain Damage: *E. M. Blass* 1501

Sleep after Exercise: *J. A. Hobson* 1503

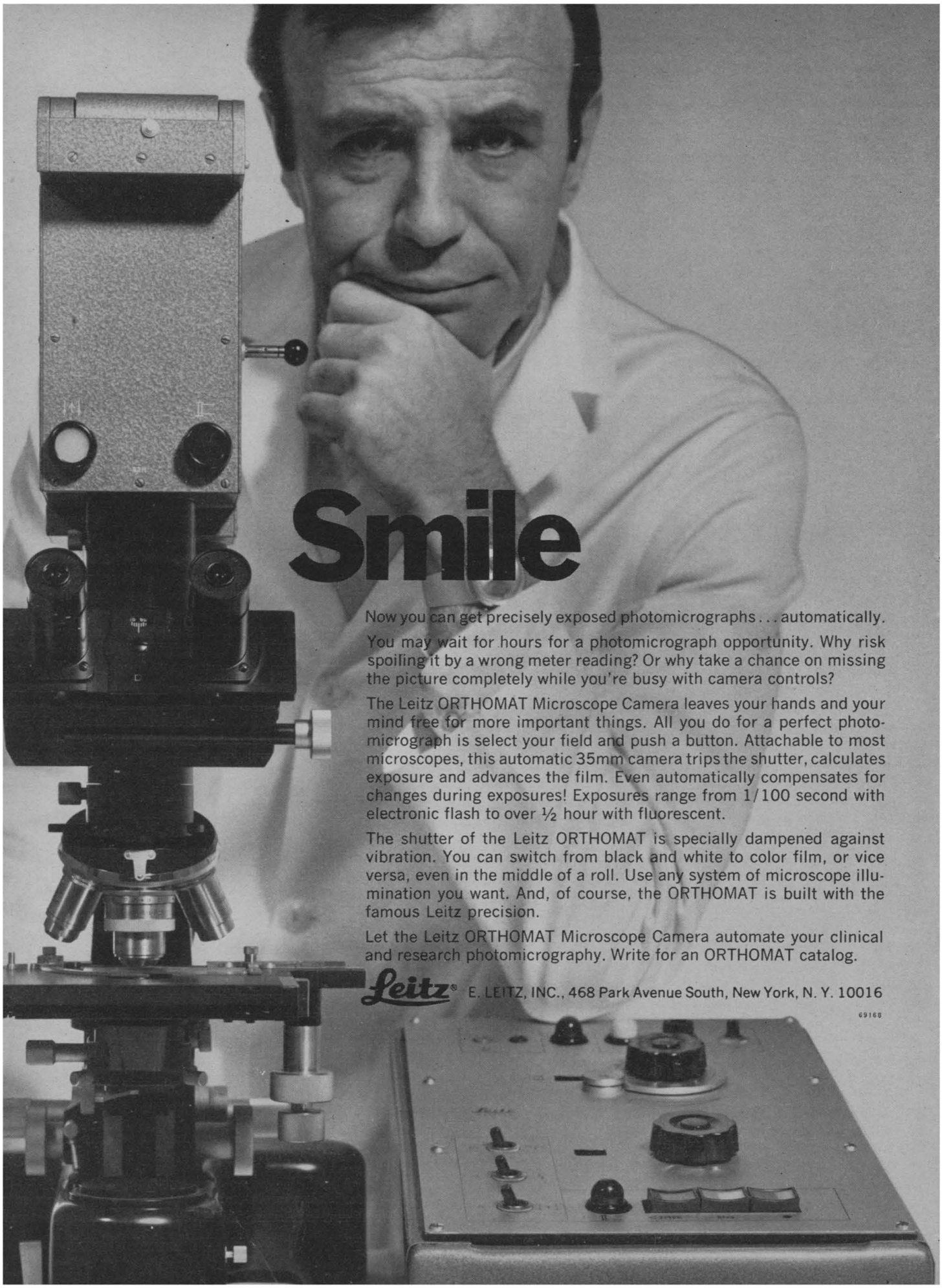
Is Orientation-Specific Color Adaptation in Human Vision Due to Edge Detectors, Afterimages, or "Dipoles"?: *C. S. Harris* and *A. R. Gibson* 1506

Technical Comments: Potassium Feldspar in Weekeroo Station, Kodaikanal, and Colomera Iron Meteorites: *T. E. Bunch* and *E. Olsen*; Chromosomal Effect and LSD: Samples of Four: *W. H. Kruskal* and *S. Haberman; F. W. Whitmore; R. S. Sparkes* et al.; Factors Determining Spatial and Size-Frequency Distributions of *Gemma gemma: R. H. Green* and *K. D. Hobson; J. B. C. Jackson* 1507

MEETINGS Peptides: *B. Weinstein* and *S. Lande*; Calendar of Events 1511

COVER

"Square of Three," by Reginald Neal, Rutgers—The State University, New Brunswick, New Jersey. A simplified version of this painting served as the test stimulus in research on a new color illusion. See page 1506.



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27 December 1968, Volume 162, Number 3861 **SCIENCE**

Lee DuBridge

The choice of DuBridge as Science Adviser to the President has been widely acclaimed, and rightly so. To the office he will bring a combination of distinction, excellent judgment, poise, and ability to communicate. These qualities will gain for him the ear of the President, the respect of Congress, and strong support from scientists and engineers.

DuBridge began his professional career as a highly regarded physicist. Next came his wartime leadership of the great Radiation Laboratory in Cambridge. Since 1946 he has served as president of the California Institute of Technology.

These are tense days on campus, but soundings at Pasadena indicate warm admiration for the way in which DuBridge has conducted affairs there. He has been flexible and therefore responsive to the changing times. He has handled touchy situations well. For example, the intense concern that Linus Pauling's views must have aroused in a conservative board of trustees did not lead to an explosion.

Good judgment is an essential ingredient of poise. The interplay of those two characteristics can be seen repeatedly in the record of DuBridge's public appearances. A recent example was the press conference, held in New York, at which his appointment was announced. The press gave DuBridge a number of opportunities to stumble, but he was surefooted.

An important asset is DuBridge's ability to communicate effectively. His lectures, though related by common threads, have been remarkably free from platitudes and worn-out ideas; they contain fresh concepts and arguments. A guest editorial in *Science* (13 December) is a fair example of his style and creativity.

The post of Science Adviser does not automatically carry with it much authority or influence. During the Eisenhower administration the science advisers, Killian and Kistiakowsky, were able to be quite effective. They enjoyed the confidence of the President, and they dealt with problems on which their advice was needed and followed. Jerome Wiesner was very close to President Kennedy, and he wielded much power. DuBridge inherits an office whose stature inevitably diminished under Donald Hornig. Despite his many good qualities, Hornig could not overcome Johnson's distaste for the intellectual.

It seems likely that DuBridge will enjoy the confidence of his President. They have had friendly contacts over two decades. Establishing a good working relationship with Congress will require flexibility and skill. During the last 5 years Congress has assumed leadership in matters of science policy and has established its own sources of scientific advice. Many of its members have become versed in pressing problems, such as pollution. In these matters, various congressmen may well feel that they have as good a basis for judgment as DuBridge has.

In the area of federal support of academic science, DuBridge must be flexible. As president of one of the top institutions of learning, he has urged emphasis on the support of excellence. The mood of Congress is clearly with those who urge more attention to geographical distribution of funds.

DuBridge faces a most interesting challenge. The good wishes of the scientific community go with him as he prepares to take on his new responsibilities.—PHILIP H. ABELSON

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Cytidine-H^3 (G) 5′-Monophosphate
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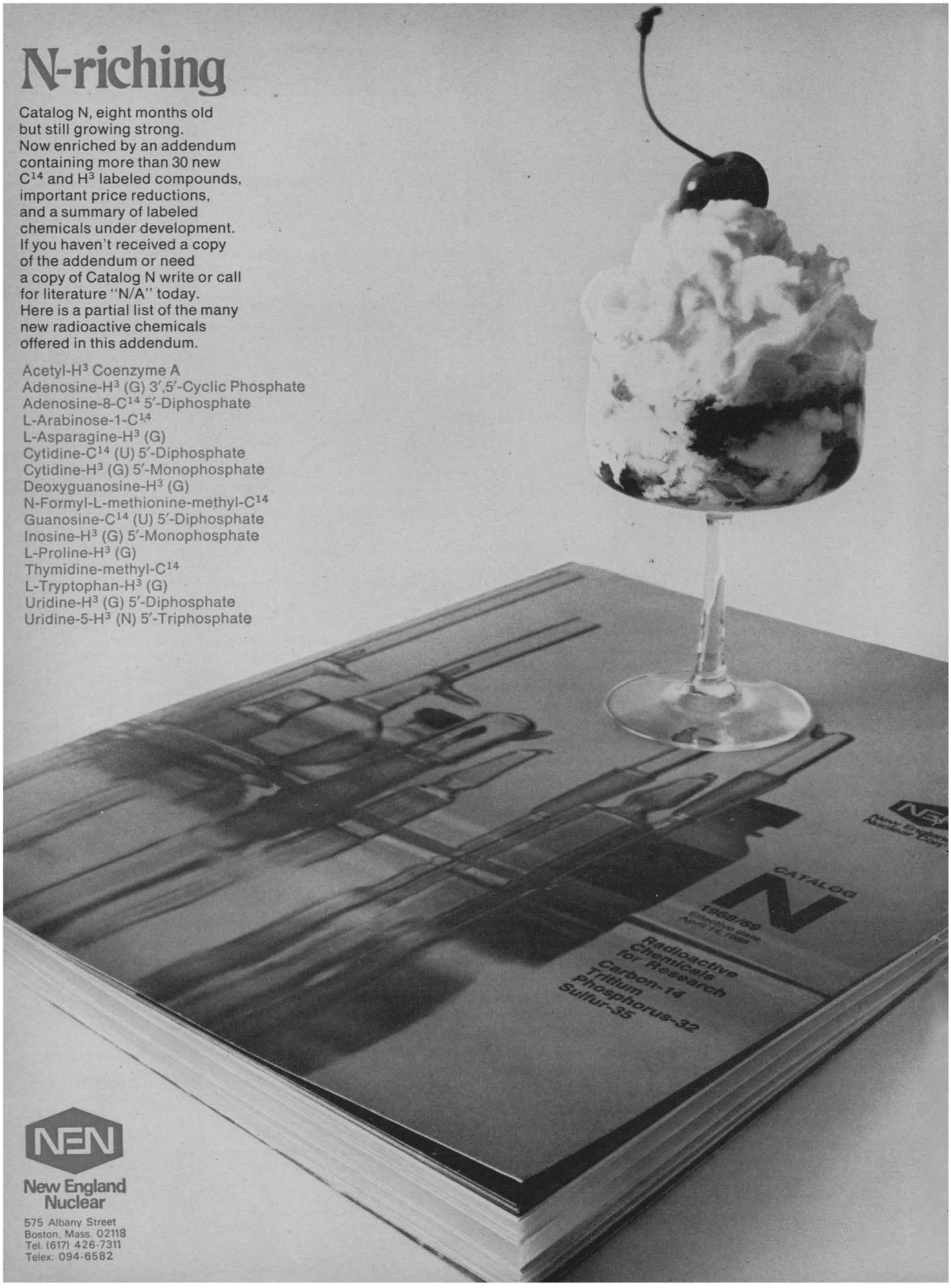
Guanosine-C^{14} (U) 5′-Diphosphate
Inosine-H^3 (G) 5′-Monophosphate
L-Proline-H^3 (G)
Thymidine-methyl-C^{14}
L-Tryptophan-H^3 (G)
Uridine-H^3 (G) 5′-Diphosphate
Uridine-5-H^3 (N) 5′-Triphosphate



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tin, has only a fraction of the activity of the pure hormone. This fact suggests that the intact NH_2-terminal end of secretin is necessary for biological purposes. Later, the problems associated with the preparation of an octapeptide residue in cholecystokininpancreozymin were pointed out, especially in regard to residues containing *O*-tyrosyl sulfonate. Use of the fat cell to explore structure-activity relations was considered by D. Rudman (Emory University School of Medicine). The reduction in free fatty acid concentration may indicate the degree of activity of both hormones and proteins, and such information can be used to correlate different peptide sequences. It was postulated that the unit tyrosyl-A_1–A_2–glutamyl–A_3–A_4–arginyl is important to the activity of a peptide hormone; further synthetic efforts are needed to verify this assumption. J. T. Potts (National Institutes of Health) presented a way of improving the Edman degradation scheme, in which gas-liquid chromatography was utilized for the analysis of the phenylthiohydantoin derivatives. The modified technique, in combination with new enzymatic procedures for the total hydrolysis of proteins, was applied to the elucidation of the hormone thyrocalcitonin. To complete the story, J. Pless (Sandoz) considered various problems associated with a total synthesis of thyrocalcitonin by a fragmentation-condensation route, which made use of some novel protecting groups.

G. W. Anderson (American Cyanamid) reviewed methods for the detection of racemization. The mixed anhydride procedure was greatly improved by using *N*-methylmorpholine rather than triethylamine as the base in the reaction. Similarly, the coupling of peptides by a mixture of *N*-hydroxysuccinimide and dicyclohexylcarbodiimide have several advantages and, under certain conditions, are free of racemization. Various oxazolones, implicated as the intermediates involved in racemization, were prepared by C. Glazer (Brooklyn Polytechnic Institute). A study of the reaction kinetics revealed that the rate of racemization is faster than the rate of ring opening and is dependent on hydrogen bonding effects. This information is very useful in the designing of new coupling agents. Racemization in cysteine peptides was explored by J. Kovacs (St. John's University), who used sulfur labeling techniques. Benzyl mercaptan served as a convenient test system in this study. N. Izumiya, in a second paper, used an ion-exchange column to separate the L-L and L-D diasteroisomeric forms of leucylalanine and leucylvaline. An extension to various tripeptides furnished a sensitive scheme for the determination of racemization. For example, *N*-benzyloxycarbonylglycyl-L-alanine was coupled with L-leucine benzyl ester in the presence of some agent, then the resulting product was hydrogenolyzed to furnish glycyl-L-alanyl-L-leucine, plus any glycyl-D-alanyl-L-leucine. An ion-exchange analyzer provided an accurate quantative measure of the two compounds. The application of gas-liquid chromatography to the separation of asymmetric isomers was explained by J. Westley (Hoffman-LaRoche). *N*-Trifluoroacetylprolyl chloride reacts smoothly with racemic amino acid methyl esters to furnish volatile derivatives, which have different retention periods. Another compound, (−)-menthyl chloroformate, has given good results in the separation of depsipeptide hydrolyzates. Nuclear magnetic resonance shifts were utilized for both the detection and determination of racemization in a wide variety of peptides by B. Weinstein (University of Washington). Generally, any dipeptide or tripeptide containing the elements L(or D)-alanyl-L-aromatic amino acid or the reverse will produce two different sets of methyl doublet signals. The application of optically active solvents to the nuclear magnetic resonance resolution of enantiomers was considered to be a useful technique.

The last part of the program dealt with special problems in the analysis and synthesis of peptides. E. Gross (National Institutes of Health) elucidated the main features of nisin as judged by reaction with cyanogen bromide. Cleavage of a methionylysyl bond afforded two major fragments, consisting of cyclic peptides with internal disulfide links. Unusual features of the primary sequence were clarified, and a tentative structure was proposed for this antibiotic. Cystine residues are found in many proteins, but existing preparative procedures for these compounds are difficult and lack wide application. R. G. Hiskey (University of North Carolina) resorted to thiocyanogen in combination with thioethers to construct large disulfide rings. A feature of this work was a possible extension to a new synthesis of insulin.

J. Meienhofer (Children's Cancer Research Foundation) delineated routes to the preparation of actinomycin D.

The peptide portion of the molecule is essential for biological activity, but its precise role is unclear and needs elaboration. The capsular polypeptide derived from anthrax bacillus was studied by D. E. Nitecki (University of California Medical School, San Francisco). The material appears to be a pure form of poly-δ-D-glutamic acid. A detailed preparation was given for the individual oligomeric peptides, including the hexamer. The solid-phase procedure was generally used, but difficulties were encountered in achieving complete purity. The stereospecific preparation of dipeptides from alkyliminophenylacetyl amino acids was outlined by K. Harada (University of Miami). Hydrogenation led to partial optical activity, which is dependent on the bulkiness of the residues, the distance between the reaction center and the catalyst, as well as chelation factors. R. Walter (Mt. Sinai Medical School) described some selenium-containing oxytocins and compared their activity to deamino-oxytocin. L-Selenocysteine was also prepared and incorporated into various peptides. Effects of chemical modification on conformation can be estimated by comparison of optical rotatory dispersion spectra.

The antigenic properties of penicillin were discussed by N. Grant (Wyeth). Antigenicity arises from an opening of the β-lactam ring to yield a penicillenic acid, followed by polymerization or diketopiperazine formation. Present evidence favors the oligomeric formulation for the antigenic factor. S. W. Fox (University of Miami) revealed that thermal polymerization of common amino acids will produce a polymer having properties similar to histones. An equivalent reaction with amino acid adenylates formed high-molecular-weight materials which are characterized as modified proteinoids. These procedures offer a model for DNA-independent formation of biologically active high molecular weight compounds in prebiotic times.

Finally, the selective labeling of the COOH-terminal amino acid in proteins in terms of deuterium or tritium was developed into an analytical technique by H. Matsuo (University of California, Berkeley). The reaction scheme involves oxazolone formation with the aid of acetic anhydride, then incorporation of deuterium at the optical center by exposure to deuterium oxide-pyridine and ring opening to the starting peptide. Hydrolysis yields the labeled COOH-terminal amino acid. This method

should have wide application in the elucidation of peptide sequence.

The edited symposium papers are to be made available in a book (Marcel Dekker, New York), which should appear early in 1969.

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Calendar of Events

Nucleic Acid and Protein Interactions, Spetsai, Greece, 6–19 July. This is the fourth Advanced Study Institute of Molecular Biology. Application forms and information may be obtained from the NATO Advanced Study Institute Secretary, M.R.C. Laboratory of Molecular Biology, Hills Road, Cambridge, England.

Water Pollution Control, Washington, D.C., 3–7 February. This course is designed for engineers, scientists, and researchers who are working in the field of control of water pollution. The scope of the course includes principles of hydrology, treats to water resources, sources of pollution, workshop on abatement technology, system analysis, economic analysis, legislation and legal aspects, and enforcement. (Jack E. Mansfield, Coordinator of Continuing Engineering Education, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006)

Fundamentals of Dynamic Measurements as Applied to the Ocean Sciences, San Diego, Calif., 11–14 Mar. The course is designed for practicing engineers, scientists, and technicians who use sophisticated electronic instrumentation in ocean research. The course outline includes units on recorders, signal generators, transducers, analog and digital conversion, waveforms, filters, amplifiers, voltage regulators, and the ocean research applications of these units. (Third Ocean Sciences Short Course, Instrument Society of America, Education & Research Services, 530 William Penn Place, Pittsburgh, Pa. 15219)

Epidemiology, Minneapolis, Minn., 15 June–3 July. Is designed primarily for teachers in medical schools, but post-doctoral fellows, graduate students, and residents in departments of preventive medicine and other medical school departments may qualify. In addition to the courses in the fundamentals of epidemiology and of biostatistics; epidemiology of cancer, cardiovascular diseases, and infectious diseases; genetics and epidemiology, new courses in epidemiology of mental disorders and of neurological diseases will be offered. Tuition: $120. Limited stipends are available. (Dr. Leonard M. Schuman, Director, Graduate Summer Session in Epidemiology, University of Minnesota School of Public Health, 1558 Mayo Building, Minneapolis 55455)