



THE **CHESAPEAKE
CHEMIST**

MARYLAND SECTION
AMERICAN CHEMICAL SOCIETY

VOL. XXXI

MAY, 1975

NUMBER 5

Presented to

Henry Taube

on the occasion of his

Remsen Memorial Lecture

sponsored by

*The Maryland Section of the American
Chemical Society*

in memory of

Ira Remsen

Teacher, Investigator, Author, Administrator

May 15, 1975



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**WHO WAS IRA
REMSEN?
See Page 7.**

The Chesapeake Chemist is published monthly September through May by the Maryland Section of the American Chemical Society. Address editorial comments to Howard J. Cohen, Glidden-Durkee, Div. of SCM Corp., 3901 Hawkins Point Road, Baltimore, Md. 21226. Phone 633-6400. Address advertising inquiries and copy to Kent R. Zeller, McCormick & Co., Inc., 204 Wight Ave., Hunt Valley, Md. 21031.

HENRY TAUBE

Henry Taube, the 30th Remsen Lecturer, was born in Neudorf, Saskatchewan, in 1915. He was educated at the University of Saskatchewan and at the University of California at Berkeley (Ph.D., 1940, under W. C. Bray).

His academic career has progressed from Instructorships at the University of California and Cornell through the ranks of Assistant, Associate, and full Professor at Cornell, the University of Chicago, and Stanford, where he has been a professor since 1962. From 1972 to 1974, he served as Chairman of the Stanford Department of Chemistry.

Dr. Taube's current research interests include new aquo ions; nitrogen as a ligand; back-bonding as affecting properties including the reactivity of ligands; mixed valence complexes; mechanism of electron transfer; nuclear magnetic resonance studies on complex ions; and new unstable species by the matrix isolation technique. This work has resulted in more than 200 papers and a book.

He has received many honors for his work, including the Harrison Howe Award, Chandler Medal, Nichols Medal, Gibbs Medal, and the Kirkwood Award. He is a member of the National Academy of Sciences, and is on the editorial boards of several distinguished journals.

MIXED VALENCE COMPLEXES

Reviews of mixed valence complexes by Hush and by Robin and Day published in 1967 revived interest in this old subject. This interest was strengthened by the systematic syntheses of substitution-inert mixed valence complexes of two different types which were reported in 1969 and 1970.

The progress made in exploring the properties of the mixed valence species based on the Ru(II)-Ru(III) ammine combination, since the first example, $[(\text{NH}_3)_5\text{Ru}(\text{O})\text{NRu}(\text{NH}_3)_5]^{5+}$ was reported in 1969, will be outlined.

The properties of interest include the absorption spectra in the visible,

in the near infrared (where a so-called intervalence transition is often observed), and in the infrared regions; the oxidation-reduction potentials (which lead to values of the con-proportionation equilibrium constants); and the energy, band width, and shape of the intervalence transition and its dependence on the dielectric properties of the solvent.

The mixed valence species that have been prepared cover the range from weak interactions between the metal centers--in this limit Hush's theories account reasonably well for the observations--to systems in which a description in terms of discrete oxidation states is no longer applicable. Delocalization can be achieved over large distances without direct overlap of the metal centered *d* orbitals.

A WARM THANK YOU

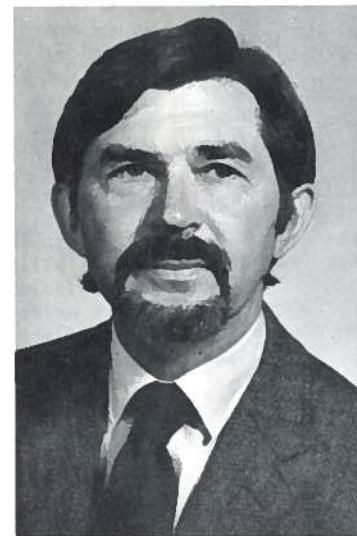
The Editors of *The Chesapeake Chemist* wish to express their appreciation to Mr. Jack Doster of Associated Printers, Inc., for the unstinting help that he has given us in the timely production of the magazine.

We also want to thank the contributors to the local Section news. Next to the meeting notice itself, these are the most important items of all: Dr. Linda Sweeting (Towson); Ms. B. S. Edwards (JHU); Ms. Lorraine Torgerson (JHU); Dr. Phyllida Willis (Hood); Ms. Harriet Cohen (UM); and Dr. Fred Gornick (UMBC).

ACADEMIC POSITIONS

TEACHING ASSISTANTS: A number of teaching assistant positions will be available in the Department of Chemistry of the University of Maryland Baltimore County (UMBC), beginning in September, 1975. Applicants should have a baccalaureate degree in chemistry and be qualified to supervise an undergraduate laboratory course. Free tuition for graduate courses is provided. Call or write Dr. Victor P. Vitullo, Department of Chemistry, UMBC, Catonsville, Maryland 21228. An AA/EO Employer

REMSEN MEMORIAL LECTURE



DR. HENRY TAUBE

DATE AND TIME:

Thursday, May 15, 1975
8:30 pm

PLACE:

Shaffer Hall, Homewood Campus of
The Johns Hopkins University

SPEAKER:

Dr. Henry Taube, Professor of
Chemistry, Stanford University

SUBJECT:

"Mixed Valence Complexes"

COCKTAILS AND DINNER:

The Johns Hopkins University
Faculty Club
Cocktails: 6:00 pm
Dinner : 6:30 pm
Price : \$7.50 (open bar)

Reservations are necessary for the dinner, and must be made with Dr. Allen Bednarczyk, McCormick and Co., Inc., 204 Wight Avenue, Hunt Valley, MD 21030

Phone: 667-7480 or 667-7470
by May 9.

ASK FOR ACS RESERVATIONS.

SOCIAL HOUR:

Refreshments will be served in the Clipper Room, Shriver Hall, after the lecture. All are welcome.

PARKING:

Free parking is available in the lot adjacent to Shriver Hall.

IMPORTANT!

ADVANCE RESERVATIONS MUST BE
MADE FOR THE DINNER.

Use the form on page 11.

NOTE THE CHANGE IN DAY OF WEEK

This meeting will be on a THURSDAY.

NICK NACKS

by Alan C. Nixon

Age Discrimination at EXXON.

The action of a federal court in New Jersey in deciding that Exxon has been guilty of age discrimination in forcing the early retirement of chemist--and ACS member--D. T. Rogers at the age of 60 is one of the most important decisions for chemists, and professionals generally, that has been handed down in a long time. It is unfortunate that Rogers died of cancer four years after his forced retirement. The action was reported in the February 6 issue of the *Wall Street Journal* and also the February 17 *C&EN*. The method that Exxon used to persuade Rogers to retire after he had refused to quit voluntarily was interesting: they transferred him to a job at which he had to stand for long periods of time, which he was unable to do. The jury awarded \$750,000 to Rogers' wife and daughter but this could go as high as \$1.5 million depending on the "willfulness" of the company's action.

In view of the large number of other ACS members who were subjected to similar treatment by their employers over the last few years, I think that the ACS should seriously consider establishing class action suits against other employers of chemists. The Rogers case certainly establishes a strong precedent.

About C&EN

On the subject of *C&EN*, I have been getting letters and comments of complaint from people that their letters to the editor are neither being printed nor acknowledged. At Edi-

torial Board meetings last year, I urged that every letter should be acknowledged by a postcard just so the writer would at least know that he had not been shafted by the postal authorities (who are experts at this operation). Further than that (which I am assured will be done now in the future), I can't understand Editor Plant's reluctance to print controversial letters. I don't think the editor should feel that it is his responsibility to agree with the point of view being advanced by every letter writer--which is what he is apparently using as a criterion. I know that there were a lot of critical letters written after the last Council meeting. I think they should have been published even though I, myself, wouldn't necessarily agree with all of the statements that I've seen in copies that have been sent to me.

Editors' Note: It is the policy of *The Chesapeake Chemist* to publish all signed letters, controversial or otherwise. Why doesn't anyone ever send us any?

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THE MAN BEHIND THE NAME

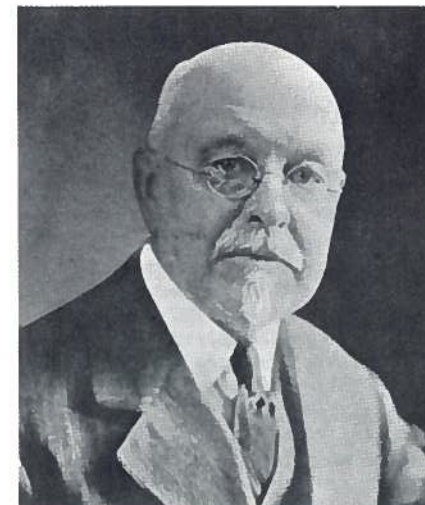
Visitors to the Hopkins Homewood campus know that the Chemistry Department is housed in part in Remsen Hall; some of them may also know that Remsen's ashes rest behind a plaque on the landing of the east stairway. But too few of them know much about the man whose memory is honored by the annual Remsen lecture.

Ira Remsen (1846-1927) was born in New York City. He obtained an M.D. degree, but not liking medical practice, he went to Germany to study chemistry. He obtained his Ph.D. under Fittig at Goettingen in 1870, and went with him to Tuebingen for two years of postdoctoral research.

Remsen returned to the U.S. and became a professor at Williams College. Research was not considered a necessary, or even a desirable, activity for professors in the 1870s. In spite of this attitude and a lack of facilities, Remsen carried out research enough for nine papers, which brought him to the attention of Daniel Coit Gilman, the President of the just-founded Johns Hopkins University. Gilman intended that the new University should follow the German model, with great emphasis on research. Sensing a kindred soul in Remsen, Gilman made him chairman of the Chemistry Department.

Remsen undertook his new position with such vigor that the output of papers from his department soon overwhelmed the *American Journal of Science*. He, therefore, founded the *American Chemical Journal* to provide a suitable American outlet for them. This journal flourished until it was merged with *JACS* in 1913.

A whole generation of outstanding chemists grew under Remsen's tutelage. They included W. A. Noyes (Illinois), Harry N. Holmes (Oberlin), C. H. Herty (later editor of *I&EC*), F. P. Kohler (Harvard), James Flack Norris (MIT), Lyman C. Newell (a great teacher and prolific author of chemical texts, of Boston University), E. C. Franklin (Stanford), E. Ermet Reid (JHU), as well as many chemical industrialists.



In addition to his personal teaching, Remsen wrote a number of texts that exerted tremendous influence on more than a generation of chemists. His *Introduction to the Study of Chemistry* went through 8 editions and was translated into 7 foreign languages.

In 1901 Remsen succeeded Gilman as President of the Hopkins. By the time he stepped down, the Homewood campus had been established and the endowment significantly increased. He was much involved in civic work where his technical background was especially useful, such as his 10 years on the Sewage Commission.

Remsen's principal research was in organic chemistry, mainly on aromatic compounds. He studied the influence of aromatic substituent groups on the susceptibility of nearby groups to oxidation, and pioneered the chemistry of the sulphonphthaleins. Nowadays he is remembered as the discoverer of saccharin, of which the commercial benefits (and--for a time--the scientific credit) went to an unscrupulous postdoctoral colleague.

The Remsen Lecture was established by the Maryland Section on the 100th anniversary of Remsen's birth as a fitting tribute to a man who excelled as a teacher, as an investigator, as an author, and as an administrator.

(Extensive use was made of Eduard Farber's Famous Chemists in preparing this article.)

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MARYLAND SECTION NEWS

ABERDEEN PROVING GROUND

Dr. LESTER P. KUHN, the Chief Chemist of the Interior Ballistics Laboratory, has retired after 33 years of Federal service, all of it at the U.S. Army's Ballistic Research Laboratories. Dr. Kuhn was honored at a dinner at the APG Officers' Club on March 8, which was attended by over 150 people. Among those paying tribute to his many achievements were Dr. Joseph H. Frazer, former chief of the Interior Ballistics Laboratory; Professor Frederick Kaufman, a BRL alumnus, now at the University of Pittsburgh; Professor Brown Murr of Hopkins; Dr. James Kolbe, the Chairman-Elect of the Maryland Section; and Dr. Robert J. Eichelberger, the Director of the BRL.

Although Dr. Kuhn has made noteworthy contributions to many areas of chemistry, he is probably best-known for his work on hydrogen bonding which he summarized in his acceptance ad-

dress upon being named the Maryland Chemist of the Year in 1973.

THE JOHNS HOPKINS UNIVERSITY

Dr. LESTER P. KUHN has been named a Fellow by Courtesy of the Department of Chemistry.

Dr. GARY H. POSHER has been awarded a Fulbright-Hays Fellowship. He will be on sabbatical leave at the University of Paris, France, from October, 1975, to June, 1976.

In print:

"Modification of Firefly Luciferase with a Luciferin Analog. A Red Light Producing Enzyme," Emil H. White and Bruce Branchini: *JACS* 97, 1243-1245 (1975).

"The Reactions of Nitrosoalkane Dimers with Acid Halides," Max A. Riba and Emil H. White: *Helv. Chim. Acta* 58, 120-130 (1975).

Book Review

A Random Walk in Science, compiled by R. L. Weber; edited by E. Mendoza. Crane, Russak & Co., Inc.; \$12.50.

"I must say, clever men are fun." So begins the forward to this fascinating collection of pastiches, parodies, poems, puns, and miscellany, all of it dealing with science or its practitioners.

The coverage is in fact much narrower than the title implies, for most of the material deals with physics or physicists, with mathematics and a smidgeon of chemistry for the rest. The contributors cover the gamut from Jonathan Swift and Sir Isaac Newton to Hans Bethe and Emilio Segre; other authors include Ludwig Boltzmann, Laura Fermi, James Clerk Maxwell, Baltimore's own R. W. Wood, Donald A. Glaser, Lord Kelvin, etc.

In general, only short pieces or excerpts are printed, which in more than one case I found frustrating. But the annoyance was overcome by the pleasure of finding such old favorites as H. Petard's work, "A contribution to the mathematical theory of big game hunting," or Arthur Roberts, "Take away your billion dollars;" and some new favorites, like Pamela Anderton's, "Which units of length?"

It is a reviewer's privilege to choose one piece for reprinting. I would have dearly loved to have made it the exceedingly clever pastiche on S. Chandrasekhar, written by John Sykes and entitled, "On the imperturbability of elevator operators: LVII, by S. Candlestickmaker," but it is too long. The second-best is hardly inferior:

THE TRIUMPH OF REASON
by Bert Liston Taylor

Behold the mighty dinosaur
Famous in prehistoric lore,
Not only for his weight and length
But for his Intellectual strength.
You will observe by these remains
The creature had two sets of brains--
One in his head (the usual place),
The other at his spinal base.
Thus he could reason *a priori*
As well as *a posteriori*.
No problem bothered him a bit
He made both head and tail of it.

So wise was he, so wise and solemn,
Each thought filled just a
spinal column.
If one brain found the pressure strong
It passed a few ideas along.
If something slipped his forward mind
'Twas rescued by the one behind.
And if in error he was caught
He had a saving afterthought.
As he thought twice before he spoke
He had no judgment to revoke.
Thus he could think without congestion
Upon both sides of every question.
Oh, gaze upon this model beast
Defunct ten million years at least.

UNIVERSITY OF MARYLAND
BALTIMORE COUNTY

A group of ACS student affiliates led by Ted Stockus recently submitted an application to form an ACS Student Affiliate chapter. This application was approved and the new chapter's charter was formally presented at the Maryland Section's April meeting, which is traditionally held at UMBC.

Mr. Stockus continues as President of the UMBC Chemical Society. The faculty advisers are Professors Robert Steiner and Ralph Pollack.

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The Uniqueness of the Earth's Climate

The Apollo astronauts reported that the earth's blue skies and white clouds, as viewed from space, made it by far the most inviting object they could see. The growing information about other planetary bodies in the solar system tends to confirm that view. Mercury and the moon are harsh, airless, and desolate places, and Mars, with its high winds, extreme variations of temperature, and frequent dust storms, is scarcely less so. Venus, once considered the earth's sister planet, is so incredibly hot and inhospitable, with its massive atmosphere and acid clouds, as to approximate descriptions of hell. The huge outer planets, constituted largely of fluids and with crushing gravitational pulls, bear a closer resemblance to dead stars than to the earth. Their icy moons, with few exceptions, are scarcely more inviting. Thus the earth, particularly in its suitability as a habitat for life as we know it, appears to be unique in the solar system.

On closer inspection, however, many geophysical and geochemical similarities can be found between the earth and its nearest neighbors, Mars and Venus. All have similar densities and hence bulk compositions that cannot be too different. According to preliminary evidence, all three planets have undergone separation of elements to form metallic cores and lighter, silicate-rich mantles and crusts. Their surfaces are topographically rough. Evidence of volcanism and crustal deformation are present on Mars and the earth and are expected on Venus. All have atmospheres which appear to have had a similar volcanic origin and roughly comparable initial constituents.

What then differentiates the earth from its neighboring planets and gives it a climate that is relatively benign? According to planetary scientists, there appear to be three main factors—the presence of liquid water, the presence of life and, to a lesser extent, the presence of a massive moon.

The role of liquid water on the earth's surface was crucial for the composition of the atmosphere, the mod-

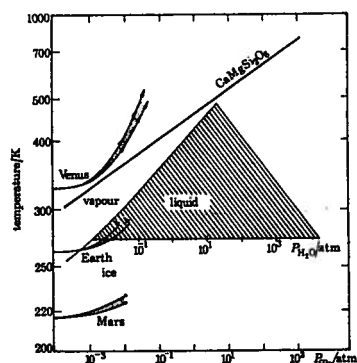


Fig. 1. The increase in surface temperature on Venus, Mars, and the earth that would have occurred in an evolving atmosphere of four parts H_2O and one part CO_2 . The region in which water can exist as liquid is shown by the hatched area. [Adapted from S. I. Rasool, NASA Headquarters, Washington, D.C.]

erate surface temperatures and, probably, the origin of life. Water could have existed as a liquid only on the earth, and not on Mars or Venus, under the conditions thought to have prevailed when their atmospheres were first formed. The reason is to be found in the relative distances of the planets from the sun's warmth. Radiative equilibrium temperatures in an evolving atmosphere of carbon dioxide and water vapor are such that ice is the stable phase on Mars, while Venus is so hot that all water remains as water vapor. On the earth water not only ended up as a liquid (Fig. 1) but, because carbon dioxide is chemically unstable in the presence of liquid water, helped to remove another atmospheric constituent. Most of the carbon dioxide on the earth is now locked up in the surface rocks. Water vapor and carbon dioxide both absorb infrared radiation strongly and hence, as major constituents of an atmosphere, could generate a powerful greenhouse effect and raise surface temperatures sharply—an evolutionary course that was narrowly avoided on the earth. (By one estimate, displacement of the earth as little as 6 million miles closer to the sun would have resulted in a runaway greenhouse, leading to a climate similar to that of Venus.) And water was, in all probability, the medium in which life evolved in its early stages.

Life itself has been a major cause of the differences between the earth and its neighbors. Oxygen, a chemically reactive element that would normally be combined with other elements, is found on the earth in its free state because of the continuing photosynthetic action of green plants and some bacteria. With oxygen as a major constituent, the earth's atmosphere has a number of non-equilibrium processes, including those which lead to the establishment of the ozone layer that screens the earth's surface from the full intensity of the sun's ultraviolet radiation. Free oxygen also makes possible a variety of chemical processes on the earth's surface, such as combustion and its biochemical equivalent in metabolism.

Finally, only the earth of the inner planets has a massive satellite, which may account for the planet's relative climatic stability and, possibly, for its strong magnetic field. On Mars, large oscillations in the obliquity or tilt of the planet's axis are thought by some to lead to gross changes in the martian climate. The oscillations are due to an interaction between two dynamic phenomena—the precession of the equinox as the tilted axis describes a conical motion and the precession of the planet's orbit plane as the entire orbit wobbles in and out of alignment with the rest of the solar system. The earth's obliquity changes very little, at present, because the presence of the moon shortens the equinoctial precession period, precluding a resonant interaction with the orbit plane precession. Without the moon, however, the earth's obliquity would oscillate even more than that of Mars, leading to far greater climatic instability than we presently experience and endangering the course of biological evolution. And at least one theory of the earth's magnetic field, which is much stronger than those of Mars and Venus and which screens the earth from the solar wind particles ejected by the sun, depends on the dynamic influence of the moon's presence.—Allen L. Hammond

MARYLAND CHEMIST AWARD

The Maryland Chemist Award was established in 1962 to recognize and honor each year, a member of the Maryland Section for outstanding achievement in the field of chemistry. The achievement may be in pure or applied chemistry, chemistry, chemical engineering or chemical education. The award is presented annually at one of the regular meetings of the Maryland Section.

Recipients to date have included:

1962	Dr. E. Emmet Reid	1968	Dr. George L. Braude
1963	Dr. W. Mansfield Clark	1969	Dr. Leslie Hellerman
1964	Dr. Alsoph H. Corwin	1970	Dr. Paul H. Emmett
1965	Dr. John C. Krantz, Jr.	1971	Dr. Giles B. Cooke
1966	Dr. Belle O. Talbot	1972	Dr. Arnold M. Seligman
1967	Dr. Walter S. Koski	1973	Dr. Lester P. Kuhn
		1974	Dr. Joyce J. Kaufman

The nominee must be a member of the American Chemical Society and a member of the Maryland Section. The meritorious achievement of the nominee shall have been accomplished within the five years previous to that in which the award is given. A previous recipient of the award is not eligible for re-nomination. If in a particular year there is no nominee deemed by the Award Committee to meet the qualifications required, the award shall not be made.

Nominations may be submitted in any format but must include, in addition to the name and present position of the nominee, your specific reasons as to why this Section Member should be so honored.

Nominations should be submitted to the undersigned not later than August 1, 1975.

Dr. Joyce J. Kaufman
Chairman, Awards Committee
Department of Chemistry
The Johns Hopkins University
Baltimore, Maryland 21218
Phone: 366-6300

TEAR OUT DINNER RESERVATION FORM

There is enclosed \$ _____ (\$7.50 per person)* for dinner reservations at the Faculty Club, The Johns Hopkins University, for the following persons.**

Name (Please print or typewrite) Affiliation

* Please make checks payable to Maryland Section, ACS and mail together with reservation form to Dr. Allen Bednarczyk, McCormick and Co., Inc., 204 Wight Avenue, Hunt Valley, Md. 21031, or phone 667-7470, 667-7480. Ask for ACS reservations.

** Return by Friday, May 9, 1975.

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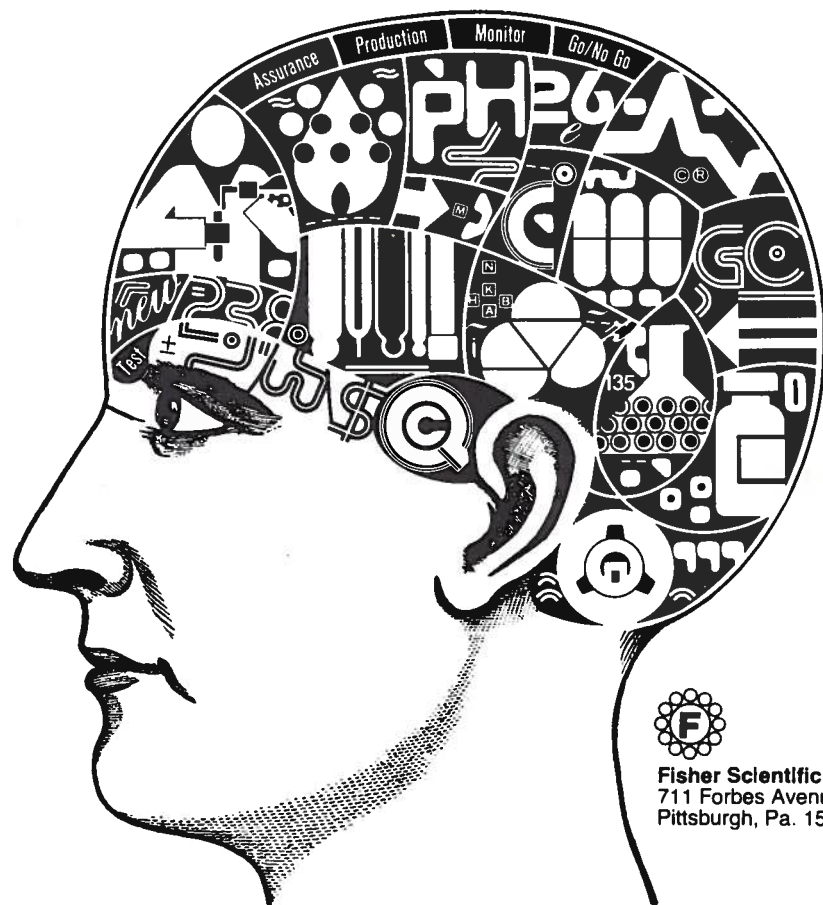
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