

157

CORRESPONDENCE *Oct. 11-20, 1952*

N. WIENER - MC 22

J.

THE JOHNS HOPKINS UNIVERSITY
INSTITUTE OF THE HISTORY OF MEDICINE
1900 EAST MONUMENT STREET
BALTIMORE-5, MD.

October 11, 1952

Dr. Norbert Weiner
Department of Mathematics
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Dr. Weiner:

This is just a line to express my appreciation of your most interesting lecture at the Philadelphia College of Physicians last week. It was a pleasure to meet you at dinner. It seemed to me that the account of your lecture given in the Philadelphia papers the next morning was better than the average press notice.

Please give my regards to Professor Deutsch.

Sincerely yours,

Richard H. Shryock

Richard H. Shryock

RHS/d

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA

The Graduate School of Medicine

HENRY L. BOCKUS, M. D., *Chairman*
Department of Internal Medicine
250 South 18th Street, Philadelphia 3

October 13, 1952.

Dr. Norbert Wiener
Massachusetts Institute of Technology
Cambridge, 39, Mass.


Dear Dr. Wiener:

I am writing to express my appreciation and that of the Alvarenga Prize Committee for the splendid oration last Tuesday night. It is my feeling that the thesis which you presented, that of closer collaboration between the physical and Mathematical sciences and medicine, is an extremely important one, and I am sure that your talk served to emphasize that thesis, and I am sure that it will do a lot of good.

It is my impression that your bill for your residence at the Barclay was going to be sent to me, but I have learned just now that you have paid it. I am enclosing a check for the amount of that bill.

With best wishes,

Sincerely yours,


H. L. Bockus, M.D.

HLE/d

[ans/d/15/52]

DR. ROBERT LINDNER
LATROBE APARTMENTS
BALTIMORE 2, MARYLAND
SARATOGA 0690

October 13, 1952

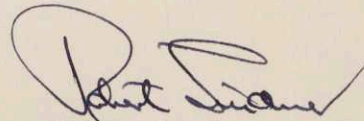
Dr. Norbert Weiner
Massachusetts Institute of Technology
Mathematics Department
Cambridge, Massachusetts

Dear Dr. Weiner:

Some weeks ago I asked my publishers, Rinehart and Company, to send you an advance copy of my new book, "Prescription for Rebellion", which is to be published on the 23rd of October. I hope this book has reached you, and that by now you've had an opportunity to read it.

I am particularly interested in knowing about any opinion you may have formed of "Rx". Will you, therefore, let me have any comments you wish to make as soon as it is convenient for you to do so?

With many personal regards,


Robert Lindner

RL:jb

[copy 10/16/52]

DARTMOUTH COLLEGE
DEPARTMENT OF MATHEMATICS AND ASTRONOMY
HANOVER, N. H.

LOUIS L. SILVERMAN
PROFESSOR OF MATHEMATICS
ON THE CHANDLER FOUNDATION

Oct 13, 1952

Professor Norbert Wiener
Mass Inst of Technology
Cambridge, Mass

Dear Professor Wiener:

I plan to be in Boston early
next week and wonder whether it will
be possible to see you some time on Monday

Oct. 20.

Possibly you and Mrs. Wiener could come
for tea at the home of Bashek Pauff
at 21 Fiske St, Cambridge at about four
in the afternoon. If not, I shall be glad
to meet you at a place and hour convenient
to you.

Sincerely yours
Louis Silverman

[ans 10/15/52]

WARNER AND SWASEY OBSERVATORY
OF THE CASE INSTITUTE OF TECHNOLOGY
EAST CLEVELAND 12, OHIO

October 14, 1952

Dr. Norbert Wiener
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Dr. Wiener:

I am very happy to hear that you are visiting in Cleveland and that you are taking part in the "Heritage of Modern Man" series of lectures.

Dr. Hunsaker tells me that as far as he knows you are not occupied for lunch on Wednesday, December 10, the date scheduled for the lecture. I wonder if you would find it possible to speak briefly and informally to the Case and Reserve Chapters of the Society of Sigma Xi? We meet for lunch about five times a year and the informal lecture lasts only about forty-five minutes." Dr. Hunsaker tells me that he would not object to such an arrangement and that he will be very happy to join us and hear you at this occasion also.

I sincerely hope that you will find it possible to come.

With many thanks, I am

Sincerely,

J. J. Nassau
J. J. Nassau, President
Case Chapter Sigma Xi

1) Usually less.

[ans 10/20/52]

Norbert Wiener



I still remember with deep affection the tolerance and understanding which my teachers showed me when I entered Tufts as a young boy needing all sorts of support and backing. My daughter has the same affection for the present staff of the college.

I first went to Tufts not very long after it had completed its first half-century of existence, and I have been able to observe it over most of its second half-century. My gratitude to the College and my belief in its future are expressed by the fact that I sent my daughter, Peggy, there. Tufts performs the functions of a great University, although it is content with the more modest name of College.

THE TUFTS WEEKLY

Tufts College, Medford 55, Massachusetts

October 14, 1952

Dear Professor Wiener,

On behalf of the Tufts Weekly and myself, I want to thank you very much for the letter of congratulations you wrote for our Centennial edition.

Our centennial was a great success, with representatives from over three hundred American colleges and universities attending, besides many other visitors. Eleven honorary degrees were conferred, and undoubtedly, you have read the important speech given by Dr. Vannevar Bush on top echelon organizational change in our National Defense setup.

Our special edition of the Weekly also proved to be a success, especially since we worked till about two AM every night during the week to get it out.

Thanks again for your time and effort.

Sincerely yours,

Paul B. Rosenberg

Paul B. Rosenberg
Managing Editor
Tufts Weekly

From: T. R. Bachiller
Calle del Torués n. 2 (El Viso) Madrid

N. S. A.

WWW30 CONSEJA





CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

INSTITUTO "JORGE JUAN" DE MATEMÁTICAS

EL DIRECTOR

Madrid 15-X-52

Prof. Dr. N. Wiener
M. I. T.
Cambridge, Mass.

Querido Prof. Wiener: Le envío por reparado los dos primeros números de una Revista de Cibornética que hemos empezado a publicar aquí, bajo los auspicios del Seminario de la Escuela de Ingenieros de Telecomunicación y de la Sociedad Matemática Española; se ha encargado de la Dirección de la Revista el Sr. González del Valle que Vd. ya tuvo ocasión de conocer durante su visita a Madrid. Siendo Vd. el fundador de la nueva disciplina nos ha parecido oportuno el solicitar de Vd. un trabajo para tener nosotros el alto honor de publicarlo aquí; acudo pues a su bondad para rogarle nos conceda Vd. ese favor que siempre agradeceremos de todo corazón.

Aprovecho ya esta carta para preguntarle a quién debo dirigirme del M. I. T. para pedir autorización para invitar a Vd. a dar un curso de dos o tres conferencias semanales, durante un mes en el Seminario antes citado.

En una de las sesiones pasadas del Patronato de dicho Seminario tuve yo el honor de proponer su nombre de Vd. para esa invitación y fué acordado por unanimidad hacerlo así y que yo personalmente hiciera la gestión. La propuesta se ha hecho con retraso porque yo he estado casi seis meses enfermo y al final he tenido que ser operado del estómago. Parada la convalecencia y reanudadas mis actividades aproveché la primera Sesión del Patronato a la que pude asistir para hacer la propuesta de su invitación.

Esperamos que nos haga Vd. el honor de aceptar dejando a su libre elección la época más conveniente para Vd.; le sugiero el aprovechar si ello es posible alguno de los viajes que Vd. hace a Europa con frecuencia.

Hace pocas noches tuve el placer de conocer al fisiólogo mexicano Prof. del Pozo y le recordamos mucho a Vd. También yo tengo mucho interés por la Fisiología del sistema nervioso y es frecuente verme entre bioquímicos, fisiólogos e histólogos!

Le ruego salude a su Señora de mi parte y Vd. reciba los más cordiales saludos de mi afirmo

T. R. Bachiller

T. R. BACHILLER

SCIENTIFIC AMERICAN

Established 1845

2 WEST 45TH STREET · NEW YORK 36, N. Y. · MURRAY HILL 7-1200

October 15, 1952

Dear Dr. Wiener:

This is written in reply to your letter of September 18 addressed to Dennis Flanagan. Our reply has been delayed because both Mr. Flanagan and I have been away from New York in this period and we, of course, felt the need to discuss the situation with which we are concerned here carefully before writing to you. I am signing this letter, because I was primarily responsible for the organization of our September issue, and hence I am responsible for the misunderstanding that has arisen between you and us.

First, let me say that I can think of few situations which could give us greater pain and regret than to lose the interest and regard you have had for SCIENTIFIC AMERICAN from our very beginning. Moreover, as you know, all of us here have the highest respect for your work and admire you for your courage as well as for your insight in the many knotty issues which arise from the progress of cybernetics.

It was this that motivated our desire to enlist you to write the Introduction for our September issue. And it was this motive, and no other that prompted Professor de Santillana to help us to secure your collaboration. We liked the Introduction very much when we received it from Professor de Santillana just before his departure for Europe. We felt that it set forth your views in admirable fashion on the philosophical and ethical questions which were reserved for you to deal with in the Introduction.

The manuscript, however, confronted us with a technical difficulty. Unfortunately, because the other authors had overstayed their deadlines, the Introduction had been written without reference to the other articles. Yet, in the design of the issue, it had to serve the literal function of an introduction; *i.e.*: to tell the readers in a straightforward manner what was to come in the articles that followed. Considering the difficulty of the subject, we concluded that it was essential to prepare the reader with an introduction based upon a reading of all of the other manuscripts.

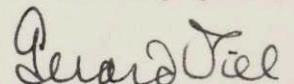
I am ready to say now that, in letting technical, pedagogical considerations overrule our conviction that an issue on the subject of automatic control should be prefaced by Norbert Wiener, we made a mistake. It is no reflection on Ernest Nagel, who wrote the Introduction which we finally published, to say that the September issue sorely missed the presence of Norbert Wiener.

To you I submit our deepest apology and regret for the slighting of your great contribution to this field which was a consequence of this decision to publish a different introductory article.

Since the issue cannot be recalled I could scarcely ask you to forgive us. But I do beg you not to attribute any meanness of motive or method either to us or, above all, to Professor de Santillana who is also an injured party and to whom we owe another apology.

I hope in the future, since your work will remain a subject of vital interest to this magazine, we shall have the opportunity to redress our error, if not the injury done you.

Sincerely yours,



Gerard Piel
Publisher

GP:jag

Dr. Norbert Wiener
Department of Mathematics
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

CALLOUS IN BLUNDERLAND

(of whom there should be more, everywhere)

mid October 1952.

Mr Norbert Wiener

% M I T Cambridge, Mass.
mentally-

and/or other/emancipated scientists, friends or acquaintances.

SCHLARAFFENLAND

('Twill doubtless be "waited" into atmospheric oblivion like H. Heine's "dust cloud from a miller's wheel" - this (still being modified or polished) paraphrasing of some of the Lorelei stanzas.) " Es waer so schoen gewesen, es haet nicht sollen sein."

Ich weiss wohl was soll es bedeuten,
Dass ich so traurig bin,
Die ewige Schande der Leuten,
Nie kommt sie ganz aus dem Sinn.

Denn Gauner je Troepfe finden,
Weil scheinbar musterhaft,
Durch Lockung fuer Reihthum so suenden,
Mit deckung von Meisterschaft.

Ich glaube ein menschliches Uebel,
Verschlinget mit Habsucht das "Recht",
Und das noch niemals die Bibel,
Verhindert, obwohl so schlecht.

**

*

**

Ihr Narren die so feige !
Gar schlimm wie die Sachen steh'n,
Glaub' nicht, dass ich jemals schweige,
So lange sie noch gescheh'n.

from -

A.B. L.L.B. & M.P.L.

1882 - ?

Studenten-Jahr

Frankfurt a/M 1900 - 1901.

Lenten Delight

No fearless man of wisdom will postpone

Contentment here, for place unknown ;
The servile-worship price he disallows,
With gleeful scorn, God disavows.

miss any good opportunity to work that
plug in about the "hot" place the church
created for its own benefit and that of
its clergy!

What surprises me is that, in this age
of enlightenment, there are people still
gullible enough to believe that; also, that
the sophists and sciolists still have nerve
to peddling that stale "plug."
You know that "the place"

About our generally conceded "leading" U.S.A. historian, Francis Parkman who was son of a D.D. (by his 1890's biographer)

"He never lost this dislike of the cloth. He had seen in history only too often how prone were theological studies to make men narrow, hypocritical and cruel; and shrank, instinctively, from nearly every element of their training, life and character, often gratifying his love of humor and of strong language by calling them "vermin". He thought them, as a class, vague, gushing, soft, spoilt by women's attentions

and published our first list of causers of wars.

This "Roll of Dishonor" contained but thirty names headed by Harry S. Truman, and included DuPont, Bradley, Dulles, and Spellman.

Since the official launching of the Crime that is Korea, the names of other Politicians, Capitalists, Generals, Churchmen, and Chrisians have had to be added to that Criminal List.

These are not merely "War-Criminals". These are the base betrayers of all honor, love, integrity, decency, honesty, always considered to be ad-

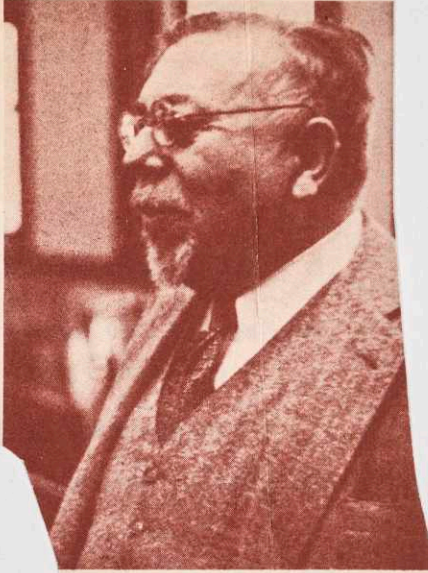
DECEMBER 10, 1952

**The Electronic Brain
and the Next Industrial Revolution**

? Nazi refugee

**Norbert
Wiener**

Professor of Mathematics, Massachusetts Institute of Technology. Author of "Cybernetics" and "Human Use of Human Beings". Has studied, lectured, and taught in America, Germany, England, Denmark, China, and Mexico.



APRIL 15, 1953

The Lively Arts

" So what ? "

**Gilbert
Seldes**

Critic, pioneer in radio and television, motion picture writer and producer, successful playwright (Broadway version of "Lysistrata"), magazine contributor, and author. Established TV program department of CBS. Phi Beta Kappa graduate of Harvard.

Keys to Peace

Condemns him !

**Hans
Simons**

President, The New School for Social Research; Professor of Political Science and International Affairs; U. S. representative at the Parliamentary Council when it drafted the Constitution and established the government of Western Germany; consultant to the O.S.S. A "man of two worlds" and an articulate and witty speaker.

THE HERITAGE OF MODERN MAN

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**Wednesday Evenings at 8:00 o'clock
(Except Tues., Nov. 18)**

ENGINEERS AUDITORIUM

St. Clair Avenue and

Tuition receipts for
be secured from the O
College, 167 Public

EIGHT LECTURES

office
and
engineers
p.m.
tues-

October 15, 1952

Mr. Emanuel H. Bloch
201 Broadway
New York, New York

My dear Mr. Bloch:

Without prejudging your client's case I may say that the line of defense suggested by your questions seems to me extremely weak. I would hesitate to make any close association between a person's formal education and his ability to perform.

In view of the fact that this line of defense will probably appear equally weak to other scientists whom you may ask, I suggest that you either work it up in a different manner, or turn to a different line of defense before sending out more such letters as the one you have sent me.

Sincerely yours,

Norbert Wiener

hb

My dear Mr. Block:

Without pre-judging ~~the~~ your client's case I may say that the line of defense suggested by your questions seems to me extremely weak. I would hesitate to make any close association between a person's formal education and his ability to perform. In view of the fact that this line of defense will probably appear equally weak to other scientists whom you may ask, I suggest that you either work it up in a different manner, or turn to a different line of defense before sending out more such letters as the one you have sent me.

If I should be called in as a witness, I should have to answer your hypothetical questions in a way very damaging to your case. Unless these questions are reframed, please consider it to your own advantage not to call on me again.

Sincerely yours.

In the meantime, unless you can persuade me much more strongly of your case, please leave me out of your further correspondence.

alterate last ¶ -

The controlling facts are not ^{a person's} formal academic training, but his ~~the~~ intelligence and habits of thought.

Without pre-judging your client's case I may say that the line of defense suggested by your questions seems to me extremely weak. I would hesitate to make any close associatio between a person's formal education and his ability to perform. The controlling facts are not a person's formal academic training, but his intelligence and habits of thought. A statement that a certain person is by education and training incapable of remembering, recording, and reproducing a certain piece of work involves a vastly more complete knowledge of that person and his abilities than can be obtained from any transcript of his formal training.

Unless you have evidence of a different sort, I should be inclined to say that the case you are making is heading for diaaster. I suggest that you either work it up in a different manner, or turn to a different line of defense before sending out more such letters as the one you have sent me.

I suspect that it may appear equally weak to other scientists to whom you may have written

Dear Mr. Block:

I am not an experienced worker in the field of the atomic bomb or any other field dealing with high explosives, and whatever I say to you is based merely on the material that you have put before me and on ~~my~~^{my} general experience as a scientist.

In the first place, when you speak of the background and education of Greenglass, you mention something which I think I ought to warn you is rather a broken reed as evidence. A man of intelligence and of an understanding in a field which has endured for sufficient time is capable of almost any degree of sophistication in the field quite apart from his formal education. In view of the fact that I am myself by training an amateur in a large number of those scientific fields in which I have been active, I would hesitate by deposition or otherwise to declare from any transcript of evidence that any Person X is ~~is~~ or is not capable of producing any specific drawing solely from memory. In particular I can give no evidence whatever without having seen the drawing.

As to the tenacity of a man's memory, I can speak for none else. But if I had familiarized myself with a piece of work in 1944 and 1945 and had understood it, I can give no limits to the degree to which I could reproduce in 1950 or 1951 a similar piece of work solely from memory and my sense of the logical structure of the problem without any outside aid or assistance or coaching. Quite frankly, the controlling facts here are not the formal academic training ~~of the person~~ but ~~his~~ *the* intelligence and habits of thought, and I have no evidence ~~whatever of these.~~

of the person ^{under} consideration

Before I can say more I must have an entire transcript of the record together with the relevant drawings. I must also be sure that in looking over this material I am not taking such risks as are involved in being cognizant of material for which I have not been cleared.

I am sorry to disappoint you in my statements. I am by no means convinced either of the genuineness or of the falseness of the testimony. What I should like to emphasize is that a statement that a certain person is by education and training incapable of remembering, recording, and reproducing a certain piece of work involves a vastly more complete knowledge of that person and his abilities than can be obtained from any transcript of his formal training. You must remember that one of the greatest Mathematicians of the 20th century was a relatively untrained and ignorant accounting clerk on one of the railroads of India. And yet ~~he~~^I would have put no limits to his power of scientific imagination.

I do not like ~~to write~~ in the least the cops and robbers attitude of modern prosecution for espionage. But frankly, I doubt if you will bet any responsible person to go out on a limb for you with material as shadowy as an answer to the questions which you ask.

Sincerely yours,

p.s. If I should at any time be called in as a witness in your case, I should be forced to say that I am unable and unwilling to testify to the limitations of the ability of any man on the basis of evidence concerning his formal education alone. Certainly, if a man were to be employed as a spy in scientific matters, his employers would see to it that he had sufficient endowment of one sort or another to acquire for himself the scientific knowledge necessary for espionage over and above his formal training. Unless you have evidence of a different sort, I should be inclined to say that the case which you are making is asking for disaster. This is not in any way a statement concerning the merits of any of the persons concerned, but merely a statement concerning the merits of the part of the case you are disclosing to me.

p.s.

If you believe that Mr. Greenglass's evidence as to his degree of education is not in accordance with the facts, the best course of action which you could take is to my mind a cross-examination concerning his acquaintance with the subjects in the present and under the advice of alleged experts in the field. If you are so thoroughly convinced that he is pretending to a degree of knowledge which he ~~die~~ does not have, this will manifest itself in such an examination. If this line strikes you as too dangerous to ~~persue~~ pursue, I can only say that the absence of such an examination would be as apparent to other experts in the field involved as to myself. Your letter has raised certain issues in my mind and almost certainly in the minds of others. And if you wish to settle the disturbing position in which you have left us, it will be necessary for you to see Mr. Greenglass through a searching cross-examination on the ~~b~~ subjects in which he claims knowledge, whether the outcome of this cross-examination may tell for your case or against it.

Out - A - Tom
Supplements
+ prepared lectures

October 15, 1952

Dr. H.L. Bockus
250 South 18th Street
Philadelphia 3, Pennsylvania

My dear Dr. Bockus:

I had a delightful time in Philadelphia, and my wife agrees with me in considering it a most pleasant and valuable trip. I wish to send my best wishes to all my Philadelphia friends.

As to the hotel bill, I am glad to receive the check, but I was under the impression that the extra hundred dollars which you gave me was to cover just such expenses, and I feel a little guilty at what seems to me like making you pay twice for my hotel expenses.

I would like to say a word or two about my friend Chafetz. I am very fond of him and he has done valuable work in helping me in Mexico. He is having a little trouble in finishing his qualification as a psychiatrist because the Board (I don't know just which one) refuses to consider either his work in Mexico (which was done in a first rate Institute) or his service with the Public Health Service on U.S. Coast Guard work as part of his time spent as a resident or in study. They would consider exactly similar work to his Coast Guard work -- which is of a psychiatric nature -- if it had been done under Army or Navy auspices.

He has two months more to stay in the Coast Guard. He would then like to get a year's residency at least partly devoted to psychiatric work at a place which would be counted for his final career, and I am having him up to Boston and saying a word for him to my friends. He is a little dejected about the way things are turning out, for it seems to him like a parchesi game in which one has tossed the die and landed on a square which says, "Go back five steps." I know that he would greatly appreciate it, as I should also, if something could be done for him in the Philadelphia area.

[Ans 10/26/52]

Dr. H.L. Bockus -- 2

I hesitate to mix in medical matters as a non-medical man, but in things like this if a man cannot depend on his friends, whom can he depend on?

Sincerely yours,

Norbert Wiener

hb

October 15, 1952

Dr. Moritz Chafetz
Public Health Service
United States Coast Guard
Cape May, New Jersey

Dear Chafetz:

I have spoken to Farnsworth and to Means at M.I.T. and they would like to see you personally besides giving you a number of leads where you should go. Let me know when you come up to Boston, and I shall prepare the ground for you. I have already written to Bockus as well to see if we can't get a bite in the Philadelphia area.

Meanwhile, don't worry yourself, for I feel that the reaction I have already obtained indicates that your situation is very far indeed from hopeless. Margaret and Peggy join me in sending regards to all of you.

Sincerely,

Norbert Wiener

hb

October 15, 1952

Mrs. Dorothy deSantillana
Houghton-Mifflin Company
2 Park Street
Boston, Mass.

Dear Mrs. deSantillana:

Here is the correspondence about which we
spoke on the telephone this morning.

Professor Wiener would appreciate your
views on it, and I hope that you can
direct this material to the proper person
at Houghton-Mifflin for comment.

Sincerely yours,

Mrs. George Baldwin
Secretary to Prof. Wiener

h

[ans 10/26/52]

COPY

October 15, 1952

Mr. Horace S. Ford
77 Massachusetts Avenue
Cambridge 39, Massachusetts

Dear Mr. Ford:

I have recently received a copy of the letter soliciting contributions to the Republican Party which you signed. I am quite aware that this letter contemplates the legitimacy of similar solicitations by other parties, and that every attempt has been made to avoid the appearance of putting pressure on M.I.T. employees in any particular direction.

In view of your high position in the M.I.T. administration, it is by no means certain that a few of the younger and less secure members of the staff may feel themselves under considerable pressure. Just how this pressure may be divided in the end between your appeal and later appeals for other parties signed by other members of the staff, I do not know. It appears to me that innocent as your act is in intention and even in execution, it opens a clear way to acts by which employees could be put deliberately under pressure, and it opens a regrettably short avenue to even less defensible practices.

I therefore humbly request you, for the good name and peace of mind of us all, to take steps to prevent this solitary incident from becoming a precedent, and to disclaim the practice before it goes any further.

Very truly yours,

Norbert Wiener

hb

[ans 10/23/52]

Mr. Horace S. Ford
Treasurer,
M. I. T.

To KWD?

Dear Mr. Ford:

I have recently received
a copy of the propaganda letter
for contributions to the
Republican Party as signed
by you. I am quite aware
that this letter contemplates
the legitimacy of similar
solicitations by other parties,
and that any attempt
has been made to avoid
the appearance of putting

2

employing corporation
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In view of your high
position in the M. I. T. administration
it is by no means certain that at least
some of the younger and less
secure members may feel
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Just how this pressure may
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your appeal and later appeals
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~~For~~ I do not know. It appears to me that innocent as your act is in intention and even in execution, it opens a clear way to acts by which employees could be put ~~intentionally~~ deliberately under pressure, and it opens a regretably short avenue to even less defensible practices.

I therefore humbly request you, for the good name and peace of mind of us all, to take steps to

prevent this solitary incident
from becoming a precedent,
and to disclaim the practice
before it goes any further.

Y S

October 15, 1952

Professor Benjamin Harrow
Department of Chemistry
The City College
Convent Avenue and 139th Street
New York 31, New York

Dear Professor Harrow:

I should be delighted to accept your invitation to lecture at City College, and I should prefer to do it on April 9. I suggest as a topic, "Cybernetic Problems in Modern Physics." This represents new work that I have under way and which should be just about right for the Journals at the time I speak to you. *sip*

I shall be glad to answer questions and to participate in the reception in the President's office and the dinner following it.

Sincerely yours,

Norbert Wiener

hb

[ans 10-23-52]

October 15, 1952

Professor H. David Lipsich
Department of Mathematics
University of Cincinnati
Cincinnati 21, Ohio

Dear Professor Lipsich:

I am extremely enthusiastic about the idea of publishing the complete work of Otto Szasz. Not only was he a very dear friend of mine, but I have always considered him a most important mathematician whose personal modesty may perhaps have prevented his receiving the full measure of scientific approval which has belonged to his accomplishment. If I can be of any further service to you in this matter, please count me in.

Sincerely yours,

Norbert Wiener

hb

October 15, 1952

Professor Louis Silverman
Department of Mathematics
Dartmouth College
Hanover, New Hampshire

Dear Professor Silverman:

We saw Bashka and her husband in Mexico, and we will look forward to seeing them again, and to talking with you. Probably the best thing is for Margaret and me to get to Foster St. independently.

Did you hear the bad news about Szasz's death? He was a very true friend of mine and I feel his loss quite severely. I am working on some physical applications of prediction theory to quantum theory, and it looks as if we have a hot lead.

Regards from house to house,

Sincerely,

Norbert Wiener

hb

October 15, 1952

Mr. Henry Simon
Simon and Schuster, Inc.
630 Fifth Avenue
New York 20, New York

Dear Mr. Simon:

Here are a few comments on jacket copy. Don't you think that "frankly and fearlessly" on p. 2 has a little of the cliché in it and weakens the passage? Then, again, I don't like the words "hilariously funny." I think "droll" is a less abused word and says quite enough. Furthermore, "border very close on tragedy" is a bit redundant: "come very near to tragedy" is perhaps better. The phrase "may not be typical of America" would be a little better as "was unusually even in America."

This brings me to "A Note About the Author." For "communications through both man and machine" I think we should substitute "communications in both man and machine." Finally, when you say "His appointment constitutes less a teaching assignment than a roving commission..." I should be inclined to say "both a teaching assignment and a roving commission..." because my teaching work, although small in bulk, is still an important reason for my getting my bread and butter.

You will see that all these are minor changes, and I hope you do not take them as an undue interference with your proper scope and function. I like the front material that you are doing very much indeed, as do those friends of mine here to whom I have shown it.

My Philadelphia medical talk and my talk to the Optical Society here came off excellently. The president of the group in Philadelphia referred in his introduction to the autobiography, and recommended it to those present, a group of perhaps 500 people. It was not on the strength of any direct leak from myself that he mentioned it, but rather because of his friendship with Farnsworth at M.I.T. who is one of the people who has read my MS. I think tht,

a

Mr. Henry Simon -- 2

early as it is, that mention did me and the book good with a particular group who are especially likely to buy the book.

Margaret and I are dining Friday at the house of Felix Deutsch, the psychiatrist. He has read the book and also seems to think well of it and wants to discuss it with us. In view of these things, and of the reaction I got at the Rockefeller Institute, I am a little more sanguine as to the sales of the book than perhaps I ought to be or than you have encouraged me to be. I agree that the main sales must be with the general public, but I think that if the book takes on in a profession as widespread as medicine it cannot fail to be mentioned by a good many doctors to their patients, and thus we have found a very inexpensive mode of advertising.

Meanwhile, I am waiting for the galleys.

Sincerely yours,

Norbert Wiener

hb

p.s. I have been thinking of the second volume discussed with Barnes and yourself. It is not a project for the immediate future but looks good as something to take up when I have definitively said my word on my scientific material. It appears to me that my new researches are already meeting a very adequate and favorable response and that the interest in them will come at just the right time to help the book. At any rate, I have a bear by the tail.

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W. P. MARSHALL, PRESIDENT

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THE ASSOCIATION OF
TEACHERS OF MATHEMATICS
IN NEW ENGLAND

129 Houston Ave.,
Milton 87, Mass.,
Oct. 16, 1952.

Professor Herbert Wiener,
Massachusetts Institute of Technology,
Cambridge, Mass.

Dear Professor Wiener:

I am writing to you as President of the Association of Teachers of Mathematics in New England to ask you if you will speak to us at an Association meeting at Boston University on the afternoon of Saturday, Dec. 6, 1952. Our afternoon session starts at 2 P.M.

The general topic for our meetings this year is: "The Importance of Mathematics", and the topic for Dec. 6 is: "The Interrelations between mathematics and other elements of Culture".

Would you be willing to address us on the subject: "The Contributions of Mathematics to Medicine"? If you would prefer another subject, please do not hesitate to suggest it. Our audience, as you know, will be composed mostly of high school and preparatory school teachers of mathematics.

May I suggest a paper which will

take about forty minutes to deliver.

I know that our Association members will be pleased and honored if you can accept our invitation for Dec. 6.

Yours sincerely,

Harold B. Garland

[and 10/20/52]

RUTGERS UNIVERSITY

The State University of New Jersey

NEW BRUNSWICK NEW JERSEY

October 16, 1952

Mr. Norbert Wiener
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Mr. Wiener:

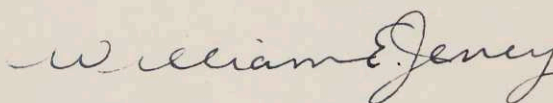
On behalf of the Lecture-Series Committee of Rutgers University, I would like to inquire as to whether it would be possible for you to speak before our undergraduate body.

In the past, we have sponsored appearances of leading personalities from the fields of science, social sciences, and the humanities. We are sure that with your extensive work in your field, you would present a most interesting and informative program for our students.

If you are able to consider an invitation to speak here, I would appreciate it if you would let me know what time or times during the academic year would be most convenient to you.

We are prepared to offer a modest honorarium.

Respectfully yours,



William E. Jeney
Chairman
Lecture Series Committee
Rutgers University
New Brunswick, N. J.

WEJ:IZR

OPTICAL SOCIETY *of* AMERICA

BRIAN O'BRIEN, *President*

INSTITUTE OF OPTICS
UNIVERSITY OF ROCHESTER
ROCHESTER 3, NEW YORK

October 16, 1952

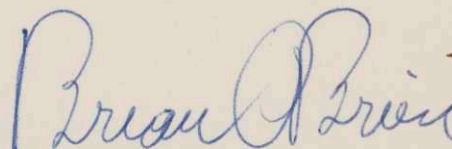
Dr. Norbert Wiener
Massachusetts Institute of Technology
Cambridge
Massachusetts

Dear Dr. Wiener:

On behalf of the Optical Society I would like to thank you for preparing and presenting one of the invited papers for the meeting last week. It impressed me as an unusually fine meeting, and much of the success resulted from the excellent invited papers on the program. We enjoyed your paper very much and appreciate your making this effort for the Society.

With best regards,

Very sincerely yours,

A handwritten signature in blue ink that reads "Brian O'Brien". The signature is written in a cursive style with a large, prominent initial "B".

Brian O'Brien

BO'B:t

*Submit us. to Ed. -
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OPTICAL SOCIETY OF AMERICA

PROGRAM OF THE

Thirty-Seventh Annual Meeting

HOTEL STATLER, BOSTON, MASSACHUSETTS

October 9, 10, and 11, 1952



CALENDAR OF MEETING

THURSDAY, OCTOBER 9

- 9:00 A.M. Registration, Mezzanine Floor
- 10:00 A.M. Symposium of Invited Papers, Main Ballroom
- 10:00 A.M. Contributed Papers, Ballroom Assembly
- 2:00 P.M. Symposium of Invited Papers, Main Ballroom
- 2:00 P.M. Contributed Papers, Ballroom Assembly

FRIDAY, OCTOBER 10

- 8:30 A.M. Registration, Mezzanine Floor
- 8:45 A.M. Annual Business Meeting, Georgian Room
- 9:00 A.M. Symposium of Invited Papers, Georgian Room
- 9:00 A.M. Contributed Papers, Parlors A and B
- 2:00 P.M. Contributed Papers, Georgian Room
- 2:00 P.M. Contributed Papers, Parlors A and B
- 2:00 P.M. Trips to industrial plants and Foundations in the Boston area. Information at registration desk.
- 7:30 P.M. Informal Dinner, Georgian Room

SATURDAY, OCTOBER 11

- 8:30 A.M. Registration, Mezzanine Floor
- 9:00 A.M. Ives Medal Address, Georgian Room
- 9:45 A.M. Symposium of Invited Papers, Georgian Room
- 9:45 A.M. Contributed Papers, Parlors A and B
- 2:00 P.M. Contributed Papers, Georgian Room
- 2:00 P.M. Contributed Papers, Parlors A and B

Always mention the Optical Society of America when making hotel reservations.

PROGRAM OF SESSIONS

(Titles and Abstracts of Papers)

N.B.—These advance abstracts are printed subject to correction of typographical errors. Authors have not seen proof. Corrections should be sent immediately to the American Institute of Physics, 57 East 55th Street, New York 22, New York. Unless corrections are received, the abstracts will be printed in the Journal exactly as they appear here.

THURSDAY OCTOBER 9, 10:00 A.M.

Main Ballroom

Symposium of Invited (25-Minute) Papers

1. "Optics and the Nature of Spectra." NORBERT WIENER, *Massachusetts Institute of Technology.*
2. "Optics and Communication Theory." PETER ELIAS, *Society of Fellows, Harvard University.*
3. "Looking into the Nucleus." FRANCIS BITTER, *Massachusetts Institute of Technology.*
4. "Quantum Electrodynamics." ROBERT KARPLUS, *Harvard University.*
5. "Properties of Germanium Phototransistors." JOHN N. SHIVE, *Bell Telephone Laboratories.*

THURSDAY, OCTOBER 9, 10:00 A.M.

Ballroom Assembly

Contributed Papers

6. Intensity Measurements in the Vacuum Ultraviolet. EDWARD C. Y. INN AND K. WATANABE, *Air Research and Development Command Air Force Cambridge Research Center, Geophysics Research Division.* (15 min.)

Intensities of dispersed radiation in the region 500–3000 Å were measured with a compensated thermocouple mounted at the exit slit of a one-meter, normal incidence, vacuum monochromator. With 1-mm slits (17 Å band width), the intensity of $\lambda 584$ of HeI was found to be as much as 0.025 microwatt over the exit slit. With a 1P21 tube coated with sodium salicylate and using 50-micron slits, the relative intensities of the first four members of the principal series of HeI at $\lambda 584$, $\lambda 537$, $\lambda 522$, and $\lambda 516$ were measured. The H_2 spectrum from 850 to 3000 Å was also obtained with the thermocouple and compared with the result of Packer and Lock.¹ The relative quantum efficiency of sodium salicylate was found to be constant in this spectral region and about 15 percent lower at $\lambda 584$. Some of these measurements were made possible by a great increase of grating efficiency after an unintentional coating of the grating with a layer of evaporated platinum.

¹ D. M. Packer and C. Lock, *J. Opt. Soc. Am.* **41**, 699 (1951).

7. Photoelectric Detectors for the Vacuum Ultraviolet. H. E. HINTEREGGER AND K. WATANABE, *Air Research and Development Command Air Force Cambridge Research Center Geophysics Research Division.* (20 min.)

By using the same light source and vacuum monochromator described in a previous paper on intensity measurements, we have obtained good results with some simple photocells which were designed by us. Although a detailed investigation of the photoelectric properties of Ni, W, Pt in the vacuum ultraviolet (current-voltage diagrams, long wavelength cutoff, aging, influence of heating, comparison of our data with what should

be expected from the quantum-mechanical theory) was made, the emphasis of this paper will be on the description of the tubes and circuits as well as in the discussion of their practical applicability. Yields were found as high as 10 electrons per 100 quanta, thus permitting the convenient use of a commercial dc amplifier and fast recorder even in the case of negative collector voltages. By applying negative voltages, the detecting device can be made insensitive to wavelengths longer than a certain value, adjustable by the external circuit. Moreover, our tubes could be exposed to air repeatedly without any noticeable change in absolute sensitivity or spectral response in the short wavelength region.

8. Absorption Coefficient of NO Bands in the Vacuum Ultraviolet. FREDERICK MARMO, MURRAY ZELIKOFF, AND YOSHIO TANAKA, *Air Research and Development Command Air Force Cambridge Research Center Geophysics Research Division.* (10 min.)

By using a 1-meter vacuum monochromator, a hydrogen discharge source, absorption cell with LiF windows, and a phosphor-coated 1P21 as detector, absorption measurements of the NO molecule were made in the region 2300–1100 Å. All the known bands (β , γ , δ , ϵ , and some other progressions observed recently) were identified in the present experiment. A continuous absorption band was observed starting at about 1400 Å with a maximum at around 1280 Å. A tentative explanation is that it may be a dissociation continuum which is the result of the transition from the ground state to the repulsive branch of the upper state of β -bands. We also observed a series of bands which seems to form a Rydberg type and converges to the first ionization potential. With regard to the δ -progression it is confirmed that at the (2–0) band this progression is cut off abruptly as has been observed in the photographic method, and it probably is the result of the predissociation of the upper state of this system at around $v' \approx 2$.

9. The Spectroscopic Analysis of Organic Polymers in the Glow Discharge. D. P. NORMAN AND W. W. A. JOHNSON, *New England Spectrochemical Laboratories.* (15 min.)

Organic compounds can be dissociated into free radicals in high current density, low vacuum discharges. The relative intensity of the emission spectra of these free radicals is proportional not only to the geometry and electrical constants of the discharge tube, but also to the composition and structure of the original polymer. The band spectra observed are mainly those of the well-known diatomic radicals such as $-\text{CH}$, $-\text{CS}$, $-\text{OH}$, but many new and unlisted bands are observed, particularly in the case of sulfur-containing compounds. This technique has proved valuable in empirical studies of the curing times and temperatures of commercial polymers, the detection and quantitative determination of amino catalysts in plastics, and in the identification of resin coatings on textiles and paper. Details of the application of this spectrographic technique to specific industrial problems in the foregoing fields will be presented.

BIBLIOGRAPHY:

- Norman, Johnson, and Johnson, *Am. Dyestuff Repr.* **37**, No. 25, *Proc. Am. Assoc. Textile Chem. Colourists*, 838–848 (1948).
R. W. B. Pearse, and A. G. Gaydon, *The Identification of Molecular Spectra* (John Wiley & Sons, Inc., New York, 1941).

10. Emission Characteristics of Vacuum-Spark Discharges. J. C. WAHR, W. W. MCCORMICK, AND R. A. SAWYER, *University of Michigan.* (15 min.)

Photocell and photographic studies have been made of vacuum spark discharges between metallic electrodes. A capacitance of 21.6 μf charged to a potential of from 5 to 20 kv is discharged through a 4-mm electrode gap in a highly evacuated metal chamber. Peak currents of 65,000 amperes can be obtained. The discharge is triggered at any predetermined voltage by injecting a few cc of helium at atmospheric pressure. Oscilloscope traces of an underdamped discharge show that the light output closely follows the current oscillations. In the visible region the light intensity increases rapidly with condenser voltage and as the circuit inductance is reduced. It is also very markedly affected by electrode size and material and by the polarity of the lower grounded electrode. Photographs of single critically damped sparks show bursts of luminous vapor which are the principal source of light. With aluminum electrodes these bursts come from well-defined circular anode spots about 4 mm in diameter, indicating current densities of from 60 to 120 kiloamperes per square cm. The peak light intensity may increase 10 to 20 times when the electrode diameter is much less than the normal spot diameter.

11. Further Investigations of Spectro-Isotopic Analysis of Lithium. J. R. MCNALLY, JR., G. K. WERNER, AND D. D. SMITH, *Stable Isotope Research and Production Division, Oak Ridge National Laboratory,* Oak Ridge, Tennessee.* (15 min.)

Recently the application of spectroscopy to the determination of isotopic abundances in various synthetic lithium isotope samples was reported.¹ The method is based on the intensity evaluation of the Li6 and Li7 isotope components in the resonance spectrum line of lithium at 6707 Å. We have since applied direct-reading photoelectric techniques to this problem and find that the analysis accuracy is improved over the photographic method by a factor of 2 or more; i.e., precision of the order of ± 0.3 absolute percent is realizable. This paper will review the method, and some results on typical standards will be presented.

* This paper is based on work performed for the AEC by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, Oak Ridge, Tennessee.

¹ Stukenbroeker, Smith, Werner, and McNally, *J. Opt. Soc. Am.* **42**, 383 (1952); see also, *J. Opt. Soc. Am.* **41**, 870A (1951).

12. Spectroscopic Assay of Lithium Isotopes. J. K. BRODY, N. FRED, AND F. S. TOMKINS, *Argonne National Laboratory.* (15 min.)

The new Argonne spectroscopy laboratory includes a 30-foot Paschen mounting utilizing either plates or photocells. Construction details will be presented of noteworthy items, e.g., the interchangeable fixed slits, grating holders, and source optical benches. For photoelectric detection, the exit slit assembly is pulled along the continuous plate rail by a Selsyn drive. Optimum masking of the grating was established by scanning Hg¹⁹⁸ lines. This spectrograph has been applied to lithium isotope assay. The fourth order of $\lambda 6707$ was scanned while the output of a fixed photocell at the second order of the same line served as internal standard. Both outputs were fed to a ratio recorder. The source was a liquid air-cooled hollow cathode tube with the sample deposited only on the bottom of the cathode. The correction for self-absorption was established by measuring the doublet intensity ratio for pure Li⁷ as a function of over-all intensity, making use of the correction for spurious background indicated by Hg¹⁹⁸ lines. It was hoped that these two corrections would yield an intensity ratio for mixed isotopes equal to the abundance ratio, but a trend of intensity ratio *versus* intensity still remain, due possibly to differential excitation. The limiting value of this trend gave the expected ratio, with a probable error for replicate determinations of 0.5 percent.

13. The Fine Structure of the $3p^2P$ -Term of Oxygen O I. D. O. DAVIS AND K. W. MEISSNER, *Purdue University.* (10 min.)

The first member of the principal triplet series, 8446 Å, and two members of the sharp triplet series, 7254 Å and 6046 Å, have been investigated by means of a Perot-Fabry interferometer which was crossed with a stigmatic plane grating spectrograph. The light source employed was a Geissler tube filled with a mixture of helium and oxygen. The wavelengths were measured with respect to neon standard lines. All three series members, originally reported by Runge and Paschen as close double lines, could be resolved into three components, the intensities of which disclose partially inverted term order of the $3p^2P_{1,2}$ term. The splittings $^3P_{2,1}$ and $^3P_{1,0}$ were found to be 0.554 cm^{-1} and -0.716 cm^{-1} , respectively. These values are in close agreement with those obtained by B. Edlén in an indirect way.

THURSDAY, OCTOBER 9, 2:00 P.M.

Main Ballroom

Symposium of Invited (20-Minute) Papers

14. "A Stigmatic Spectrograph Crossing Echelle and Concave Grating." GEORGE R. HARRISON, *Massachusetts Institute of Technology.*
15. "Rocket Spectroscopy." R. TOUSEY, *U. S. Naval Research Laboratory.*
16. "Classification and Assignment of Ultraviolet Spectra of Conjugated Organic Molecules." JOHN PLATT, *University of Chicago.*
17. "Line Spectra in Radio Astronomy." E. M. PURCELL, *Harvard University.*
18. "Spectroscopic Measurements in Very Short Time Intervals." GERHARD DIEKE, *The Johns Hopkins University.*
19. "Multi-Channel Spectrometry." P. B. FELLGETT, *The Observatories, Cambridge University, England.*

THURSDAY, OCTOBER 9, 2:00 P.M.

Ballroom Assembly

Contributed Papers

20. The Variability of Measurements with the Macbeth Illuminometer. AILENE MORRIS, FREDERICK L. MCGUIRE, AND FORREST L. DIMMICK, *U. S. Naval Medical Research Laboratory, U. S. Naval Submarine Base, New London, Connecticut.* (10 min.)

The absolute limits of brightness judgments made with the Macbeth illuminometer were established. By using psychophysical procedure, practiced observers, and the most careful control, the match varied plus or minus 1.4 percent. A screen illuminated by a calibrated lamp source was measured by a group of operators. Their readings varied plus or minus 14 percent. The variability of these measurements was ultimately reduced to plus or minus 4 percent by following the improved technique outlined below: (a) Calibrate instrument in darkness. (b) Repeat calibration; use exact mean of ten readings. (c) Carefully check amperage during calibration and subsequent illumination measurements.

21. **A Psychophysical Procedure for Studying Dark Adaptation Quantitatively.** STANLEY W. SMITH, AILENE MORRIS, AND FORREST L. DIMMICK, *U. S. N. Medical Research Laboratory, U. S. N. Submarine Base, New London, Connecticut.* (10 min.)

Studies of dark adaptation usually utilize some procedure which permits only qualitative determinations of sensitivity levels. The procedure described in this report permits quantitative analyses of dark adaptation from a few experimental sessions. By using the procedure suggested, data were obtained after adaptation to light of different "red" spectral compositions. The results are presented to illustrate the application of this method.

22. **The Frequency and Amplitude of Ocular Tremor.** G. C. HIGGINS AND K. F. STULTZ, *Kodak Research Laboratories.* (15 min.)

Data are presented on the magnitude and frequency of eye motion (rapid motions superimposed on slow drifts) during fixation on a target. A record of these motions was obtained by directly photographing a blood vessel of the eye. Vertical and horizontal motions were recorded for both monocular and binocular fixation. The rapid motions were found to occur at an average of every 0.02 second and to have an average amplitude of 1.2 minutes of arc. These data are in approximate agreement with previous data of Adler and Fliegelman,¹ Lord and Wright,² and Ratliff and Riggs.³ Simultaneous head and eye motion traces show that the rapid eye motions are independent of head motions.

¹ F. H. Adler and F. Fliegelman, *Arch. Ophthalmol.* 12, 475-483 (1934).
² M. P. Lord and W. D. Wright, *Nature* 162, 25-26 (1948).
³ F. Ratliff and L. A. Riggs, *J. Exptl. Psychol.* 40, 687-701 (1950).

23. **The Effects of Counteracting the Normal Movements of the Eye.** LORRIN A. RIGGS, *Brown University,* AND FLOYD RATLIFF, *Harvard University.* (15 min.)

A system has been devised for causing an image to remain at one point on the retina regardless of eye movements. A beam of light, reflected from a plane mirror on a contact lens, is used to project onto a screen an image of a dark line against a bright background. The screen is viewed by the same eye through an optical system which halves the apparent size of target and screen. Halving the size of the viewed field compensates for the doubling of the angle of rotation of the beam projected from the mirror on the contact lens. Thus, any motion of the eye causes a deviation of the beam such that the retinal image of the projected line undergoes the same displacement as do the retinal receptor cells. By comparison with normal viewing of the same test objects it is found that (1) when first presented, the finest lines are seen with normal or slightly better than normal acuity, (2) within a few seconds the lines begin to disappear, and (3) within one minute even coarse lines are seen only intermittently. The results demonstrate the importance of normal eye movements for overcoming local retinal adaptation to a stationary field. These experiments were conducted at Brown University under contract with ONR.

BIBLIOGRAPHY:
F. Ratliff, *J. Exptl. Psychol.* 43, 163-172 (1952).

24. **A Note on Photographing the Eye Fundus in Color.** KENNETH N. OGLE, *Mayo Foundation and Mayo Clinic, Rochester, Minnesota.* (10 min.)

A modification of the second model of the Zeiss Nordensen retinal camera and the optical problems involved are described. A high speed flash tube is adapted to the camera to replace the incandescent lamp light source. Ektachrome film is used because an effective increase in film speed can be obtained in development. The high speed flash eliminates the effects of blinking and of movements of the eye being photographed.

Examples of the transparencies of fundus photographs obtained with the camera are shown.

25. **Irregularities of Retinal Illumination Resulting from an Artificial Pupil.** W. H. KINCAID AND H. RICHARD BLACKWELL, *University of Michigan.* (15 min.)

In the course of a recent experiment, subjects observed an extended screen of uniform luminance through apertures in metal plates, serving as artificial pupils. Each subject reported seeing a dark disk in the center of the field of view. Darkening of the center of the field can readily be demonstrated with a glass lens. It may be shown to result from positive spherical aberration. A procedure has been developed for calculating the light distribution of the retinal image for given spherical aberration.

26. **Spatial Summation in the Central Fovea.** H. RICHARD BLACKWELL AND GEORGE A. AUSTIN, *University of Michigan.* (20 min.)

Detection thresholds have been measured for circular disks varying in size from 0.7 to 64 minutes of arc, in order to define the limits of spatial summation in the central fovea. A forced-choice psychophysical method was employed. The background luminance was zero. The disks were near-monochromatic light, of 526 m μ peak wavelength. Monocular vision, with 2.26-mm artificial pupil, was employed. The exposure time was 0.001 second. The refractive condition of the eye was determined in the experimental apparatus, utilizing a stigmatoscope. These experiments were intended to provide a measure of spatial summation under conditions in which blurring of the retinal image would be calculable, and of nearly minimum extent. Data are available for two subjects. A large amount of spatial summation was found. It is suggested that at zero luminance a pure cone population operates with the diffuse spatial characteristics usually attributed to rods.

27. **Foveal Contrast Thresholds for Single Flashes of Various Durations.** H. RICHARD BLACKWELL AND DONALD W. MCCREADY, JR., *University of Michigan.* (20 min.)

Foveal contrast thresholds have been measured for each of four circular disks at each of seven exposure durations, varying from 0.001 to 1 second. The disks have diameter values of 1, 4, 16, and 64 minutes of arc. The measurements have been made at a number of background luminance values, within the limits of 1×10^{-3} and 100 foot-Lamberts. All measurements have been made with a forced-choice psychophysical method. Data are available on two subjects. The data have been utilized to evaluate the reciprocity of contrast and disk area and the reciprocity of contrast and exposure time. Regions of the experimental variables are found in which near-reciprocity of these quantities exists. There are, however, systematic departures from complete reciprocity of time and contrast under nearly all experimental conditions.

FRIDAY, OCTOBER 10, 9:00 A.M.

Georgian Room

Symposium of Invited (25-Minute) Papers

28. **"Enzyme Reactions in Living Cells."** BRITTON CHANCE, *Johnson Research Foundation, University of Pennsylvania.*

29. **"Optics and the Physiological Basis of Vision."** H. K. HARTLINE, *The Johns Hopkins University.*

30. **"Production of Organic Free Radicals by Light."** H. MARK, *Polytechnic Institute of Brooklyn.*

31. **"Air Photography."** DUNCAN E. MACDONALD, *Director, Boston University Physical Research Laboratory.*

32. **"The Ultraviolet Microscope and Some Biological Applications."** E. WILFRED TAYLOR, *Cooke, Troughton & Simms, Ltd., York, England.*

33. **"Recent Developments in Infrared Spectroscopy."** R. C. LORD, *Massachusetts Institute of Technology.*

FRIDAY, OCTOBER 10, 9:00 A.M.

Parlors A and B

Contributed Papers

34. **A Method for Measuring the Contrast Rendition of Optical Systems for Targets Having Various Angles of Subtense.** H. S. COLEMAN, L. V. FOSTER, AND D. L. FRIDGE, *Bausch & Lomb Optical Company, Rochester, New York.* (10 min.)

A method has been developed for measuring the contrast rendition of optical systems when used to view line targets and other targets of practical importance. A device called the Recognition Contrast Rendition (RCR) Apparatus has been designed and constructed. The RCR Apparatus scans the image produced by an optical system using an appropriate scanning aperture and a photoelectric recorder. Targets having an opaque circular, square, or rectangular area and silhouettes of realistic objects may be used in the RCR Apparatus for investigating detection and recognition phenomena. The basic data occurs naturally in the form required for use with visibility nomographs. The most useful test object is a line target in which the widths of successive bands decrease according to a power series. Parameters which may be controlled are field angle, surround brightness, target contrast and orientation, and spectral composition of the target illumination. The limit of visual resolution may be directly compared with the RCR value to obtain data on the contrast threshold of the eye. Telescopes, objectives, microscopes, and components such as eyepieces and prisms may be tested. Since the RCR Apparatus is objective, it lends itself to inspection and quality control of instruments being mass produced.

35. **Tests of Aerial Camera Lenses of Large Aperture with a Twyman Interferometer.*** THEODORE R. YOUNG, *National Bureau of Standards.* (15 min.)

A Twyman type interferometer with elements 10 inches in diameter has been constructed by the optical shop of the National Bureau of Standards. This instrument has been applied in a test of two aerial camera lenses of approximately 8-inch aperture. Interferograms obtained as part of this test are shown. One of the lenses is of the telephoto type. In general, when testing a telephoto lens on a Twyman interferometer, the effective source aperture must be made very small. Lens performance is compared to the Rayleigh tolerance. Manufacturing defects, apparent in the interferograms, are shown.

* This work was supported in part by the U. S. Air Force and U. S. Army Signal Corps.

36. **A New Device for the Photoelectric Examination of an Aerial Image.*** R. V. SHACK AND F. E. WASHER, *National Bureau of Standards.* (15 min.)

A photoelectric image scanner has been developed to provide a method of testing lenses which is objective, independent of the response of an emulsion or of the eye, and reasonably rapid. This instrument provides a plot of the light distribution

in the image produced by the lens under test. The scanning action is produced by a rotating six-sided mirror. A microscope objective focused on the image being examined produces a collimated beam which strikes the mirror. A small telescope objective receives the reflected beam and reforms the image in the plane of a fine adjustable slit behind which is a photomultiplier tube. The photomultiplier tube is connected to an oscilloscope which produces the display. A special feature is the selection of an intermediate scanning speed. The mirror rotates one revolution per minute, producing one complete trace every ten seconds. This is rapid enough to allow adjustments to be made while observing the oscilloscope screen, and yet the separate traces are far enough apart to allow them to be photographed individually.

* This work was supported in part by U. S. Air Force and U. S. Signal Corps.

37. **The Measurement of Refractive Index Gradients in Glass Plates of Very Large Thickness.*** JAMES B. SAUNDERS AND THEODORE R. YOUNG, *National Bureau of Standards.* (15 min.)

When measuring the refractive gradients in glass by means of the Twyman-Green interferometer (the method usually used for interferometer), the thickness of the sample to be tested is limited by the quality of the monochromatic source used. The mercury 198 isotope source, operating under ambient conditions, permits measurements on plates of thickness up to approximately 4 inches. If this source is supercooled, the limit in thickness may be considerably increased. The cost of operation and inconvenience of supercooling the 198 mercury source, however, makes its use impractical for general testing. A modification of the Dowell Angle gauge interferometer¹ permits the measurement of refractive gradients in plates of very large thickness, with any ordinary monochromatic source, because the order of interference can always be made quite small. A description of this interferometer and its application to the measurement of index variations in a glass disk 5 inches thick is given.

* This work was supported in part by U. S. Air Force and U. S. Army Signal Corps.

¹ A. Candler, *Modern Interferometers* (Hilger & Watts Ltd.), Chap. XIII.

38. **An Application of Photographic Photometry to Headlamp Developments.** DAVID L. WILLIAMS, *Lamp Division, Westinghouse Electric Corporation.* (15 min.)

A practical method of application of photography is used as an assisting tool in the study of isocandle distribution of the illumination fields of experimental and production automotive headlamps and similar lighting units.

39. **Refractive Index of Fused Quartz from 0.347 to 3.5 Microns.*** ROBERT J. SPINDLER AND WILLIAM S. RODNEY, *National Bureau of Standards.* (15 min.)

The refractivities of two samples of European (Hereaus) and two samples of domestic fused quartz have been studied. The indexes of one of the European samples were measured at two temperatures for thirty wavelengths. The indexes of the other European and the two domestic samples were measured at one temperature for ten selected wavelengths spanning the spectral range studied. Indexes for wavelengths in the visible spectral region were measured on a Watts spectrometer by the method of minimum deviation. Indexes for wavelengths outside the visible region were measured on a Gaertner spectrometer equipped with mirror optics. Temperature coefficients of index were computed and used to adjust the indexes of all samples to a common temperature. The European samples were almost identical but lower in index than the domestic samples by about 2.8 in the fourth decimal place. Small differences in dispersion were also detected.

* This work was supported in part by the U. S. Air Force and U. S. Army Signal Corps.

40. **A Cathode-Ray Tube Microdensitometer.** H. G. YUSTER, *New Brunswick Laboratory, U.S.A.E.C.* (15 min.)

A cathode-ray tube microdensitometer, similar to that described by Davis and Webb,¹ was constructed for the purpose of measuring weak spectral lines which are ordinarily lost in the background. The advantage of this instrument over the spotting type is that it permits the simultaneous viewing of line and background densities after both have been traced. An Applied Research Laboratories-Dietert densitometer was used as the basic unit, with a few changes made to adapt this instrument for use. A new type of carriage drive and sweep mechanism was designed and the phototube and sweep amplifiers modified for the type of electronic tubes produced in this country.

¹ H. M. Davis and R. J. Webb, *Spectrochim. Acta* **4**, 13 (1950).

41. **A Dilation Interferometer with Strip Chart Recording.** MILTON GREEN AND S. BENEDICT LEVIN, *Signal Corps Engineering Laboratories, Fort Monmouth, New Jersey* (15 min.)

A commercially available dilation interferometer (Gaertner manufactured, Bureau of Standards developed)^{1,2} has been converted into a recording instrument by the simple addition of a 1P21 photomultiplier tube with its associated power supply, housing, and optical pick-up system and used in conjunction with a commercial two-point strip chart recorder. One point records the temperature of the specimen as measured by a thermocouple in the proximity of the interferometer. The other point records the intensity of the light entering the pupil—a 1/16-inch diameter hole—of the photomultiplier receiver housing. The fringe pattern, which is focused in the plane of the entrance pupil, records as a $\cos^2 \times$ curve on traversal of this opening. Thus it is possible to measure fringe shifts accurately to one-quarter wavelength. Measurements of thermal expansion have been made on several materials and the results are in agreement with existing values.

¹ G. E. Merrit, *J. Research Natl. Bur. Standards* **10**, 59 (1933).

² J. B. Saunders, *J. Research Natl. Bur. Standards* **23**, 1279 (1939).

42. **Mechanism of Polishing Glass as Determined by Multiple-Beam Interference Techniques.** W. F. KOEHLER, *U. S. Naval Ordnance Test Station, Inyokern, China Lake, California.* (20 min.)

Sharp fringes of equal chromatic order will be shown to reveal the size and shape of irregularities on a polished surface as small as 20A in height, to present evidence that glass does not flow during polishing with rouge and barnsite, and to substantiate Thompson's planing theory of polishing based upon his observations with a lens. A quantitative difference between polishing with rouge and barnsite has been obtained as well as the characteristics of bowl-feed, fresh-feed, and fine-feed polishing.

FRIDAY, OCTOBER 10, 2:00 P.M.

Georgian Room

Contributed Papers

43. **Imperfections of Thallium Halide Mixed Crystals.** A. SMAKULA, J. KALNAJS, AND V. SILS, *Laboratory for Insulation Research, Massachusetts Institute of Technology, Cambridge, Massachusetts.* (15 min.)

Mixed crystals of thallium halides grown from the melt compositions corresponding to the known minimum melting points^{1,2} show a small but, for optical use as prisms, an intolerable inhomogeneity. The lattice constant, the density, and the refractive index show changes along the crystallization

direction. This inhomogeneity may result from incorrect composition, segregation of the components in the temperature gradient during the growing process, decomposition of the melt, or impurities. It has been found by precise determination of lattice constants, and by chemical analysis, that the main disturbing factor is the incorrect composition. Previous determinations of the minimum melting points for TlCl+TlBr and TlBr+TlI are not correct. The new determined minimum melting points are: 70 ± 0.2 mole percent TlCl+30 mole percent TlBr, mp 422.7°C . 46 ± 0.2 mole percent TlBr+54 mole percent TlI, mp 413.4°C . The crystals grown from the melt corresponding to the above compositions show no deviation of the lattice constants up to the fourth decimal place. The lattice constants, the densities, and the thermal coefficients of expansion have been determined for the crystals of pure components and the mixtures corresponding to the new minimum melting points.

¹ K. Moenkemeyer, *Neues Jahrb. Min. Geol. Pal.* **B22**, 1 (1906).

² R. Kooops, *Optik* **3**, 298 (1948).

44. **The Infrared, Ultraviolet, and Visible Indexes of Cesium Bromide.*** WILLIAM S. RODNEY AND ROBERT J. SPINDLER, *National Bureau of Standards.* (15 min.)

The refractive indexes of two crystals of cesium bromide have been measured for wavelengths ranging from 0.349 to 39.22 microns. The indexes were determined by the method of minimum deviation on a Gaertner precision spectrometer adapted for measuring indexes of nonvisible radiation. This adaptation consists of using mirror optics, and physical detectors (lead sulfide cell and Golay pneumatic detector). A description of this instrument¹ was presented at the 1952 spring meeting of the Optical Society at New York. The index variation over the spectral range considered is approximately two units in the first decimal place. Indexes for the visible portion of the spectrum were also measured on a Watts precision spectrometer by the usual minimum-deviation method. The index of refraction and dispersion of the two crystals are compared. The dispersions of cesium bromide and other infrared transmitting media are compared.

* This work was supported in part by U. S. Air Force and U. S. Army Signal Corps.

¹ Stephens, Plyler, Rodney, and Spindler, *J. Opt. Soc. Am.* **42**, 286 (1952).

45. **The Precise Measurement of the CO and CO₂ Bands from 4 to 5 μ .*** EARLE K. PLYLER, NORMAN GAILAR, AND JOSEPH J. BALL, *National Bureau of Standards.* (15 min.)

The 4.25 μ band of CO₂ and the 4.67 μ band of CO have been measured by a grating spectrometer, which has recently been constructed having a 7500 line/inch grating and a paraboloidal mirror of 70-cm focal length. A PbTe cell was used as the detecting unit. Precise measurements of the wavelengths of the rotational lines were obtained by superimposing higher orders of well-known atomic lines upon the absorption spectra. Three bands have been observed in CO which arise from the molecules C¹²O¹⁶, C¹²O¹⁸, and C¹³O¹⁸. The molecular constants which have been calculated agree closely with those found by measurement of the first overtone band.¹ The measurements on CO₂ have been confined to the two molecules C¹²O₂¹⁶ and C¹³O₂¹⁶. The wavelengths measured for the individual lines of the P and R branches differ from those reported by Nielsen by approximately 4A.² A table of the observed wavelengths for bands of CO and CO₂ will be shown.

* This work was supported by ONR.

¹ Plyler, Benedict, and Silverman, *J. Chem. Phys.* **20**, 175 (1952).

² A. H. Nielsen and Y. T. Yao, *Phys. Rev.* **68**, 173 (1945).

46. **Measurements of Solar Spectral Irradiation and of Vertical Atmospheric Attenuation.** L. DUNKELMAN AND R. SCOLNIK, *Naval Research Laboratory.* (10 min.)

The solar spectral irradiation outside the earth's atmosphere was determined by Langley's method of extrapolation to zero

air mass, from measurements taken at an elevation of 8025 feet near Tucson, Arizona, during October, 1951. The spectrum was produced and scanned by a Leiss quartz double-monochromator, detected by a 1P21 photomultiplier, amplified, and presented on a strip chart recorder. About twenty-five spectra were recorded from sunrise to noon, with band widths ranging from 10A at 3030A to 170A at 7000A. The equipment was calibrated frequently by recording the spectrum of a standard tungsten lamp. Our results agree best with those of Pettit. They do not support the work of Götz and Schönmann, Hess, or Reiner below 3800A. The irradiance of 10 watts/m²/100A measured at 3300A compares well with 9 watts/m²/100A obtained by direct measurements from rockets. The change of intensity with air mass showed that the atmospheric attenuation was approximately fifteen percent higher than that for Rayleigh atmosphere. Calculation from the absorption spectra of the Huggins and Chappuis bands indicated the presence of 2.0 mm of ozone. The solar illuminance computed from spectral data was 11,500 lumens/ft². Clear and constant atmospheres made good measurements possible.

47. **Infrared Transmission of Artificial Fog.*** T. KING McCUBBIN, JR., *The Johns Hopkins University.* (10 min.)

The author produced a suspension of water droplets in air by focusing a 50-watt underwater beam of ultrasonic sound waves on to the surface of water with a concave glass reflector.¹ From the base of the waterspout which is formed above the surface of the water, there emanates a dense fog. Microscopic examination of the fog particles reveals their radius to be of the order of a micron, about one-tenth the size of most natural fog particles. Optical transmission of a 10-cm path through this fog has been measured from 0.4 to 22.5 microns. Its transmission is 0.15 percent throughout the visible spectrum, reaches a maximum of 45 percent at 10.5 microns, decreases to 5 percent at 16 microns, and increases to 20 percent at 22 microns.

* This research was supported by the ONR, Contract Nonr-248 (01).

¹ F. E. Fox and V. Griffing, *J. Acoust. Soc. Am.* **21**, 252 (1949).

48. **Theory of the Brightness of the Sky, Particularly the Twilight Sky.** E. O. HULBERT, *Naval Research Laboratory, Washington 25, D. C.* (15 min.)

Accurate data of sky brightness during twilight at Sacramento Peak, New Mexico, are available.¹ Measurements showed that the attenuation of the overhead atmosphere was within about 20 percent of that of Rayleigh; the ozone was also measured to be about 2 mm. When the zenith sky brightness was calculated from Rayleigh theory for pure air, using known upper air densities from rockets, theoretical values 2 to 6 times the observed values were obtained for solar depression angles below the horizon from about 0° to 7°. When the absorption of the Chappuis band of ozone was introduced into the Rayleigh calculation, the theoretical values came into agreement with observation. For the sun below 7° the calculated sky brightness fell rapidly below the observed brightness showing that the zenith sky brightness was the result of multiple scattering, as has been long known, and was not influenced perceptibly by the air above about 50 km. Another result was that the color of the zenith sky is Rayleigh blue during the day, is a mixture of Rayleigh blue and ozone blue at sunset, and is entirely ozone blue during twilight.

¹ Koomen, Lock, Packer, Scolnik, Tousey, and Hulbert, *J. Opt. Soc. Am.* **42**, 353 (1952).

49. **The National Bureau of Standards—Georgetown Observatory Solar Spectrograph.** C. C. KIESS AND F. J. HEYDEN, *National Bureau of Standards and Georgetown University Observatory.* (10 min.)

Several problems concerning the sun's spectrum remain unfinished: (1) the origin of most of the faint lines of the

spectrum, about 30 percent of the 26,000 recorded photographically, is still unknown; (2) similarly, the origin of the vast majority of characteristic sunspot lines is practically unknown; (3) standard wavelengths, determined by interference methods, are still lacking in the ultraviolet below 3700A and in the infrared above 9900A; (4) variations in wavelength in light from center of the disk to limb are available for only a small number of lines. As a step toward the solution of some of these problems, the Spectroscopy Laboratory of the National Bureau of Standards and the Georgetown Observatory, in cooperation, have set up a concave-grating spectrograph in one of the basement rooms of the Observatory. The room is surrounded on all sides by thick masonry walls that insure steady temperature conditions. The spectrograph mounting is in the Wadsworth style wherein the grating is illuminated by parallel rays from a collimating mirror. The collimator itself is the one designed and built at the National Bureau of Standards, under I. C. Gardner's direction, for use on eclipse expeditions. Sunlight is delivered to the collimator by means of a coelostat. Two 21-ft concave gratings of almost identical radius of curvature are available for forming the spectra: one ruled with 20,000 lines per inch on Rowland's machine; the other with 30,000 lines per inch ruled by the late Professor H. G. Gale of the University of Chicago. It is now owned by the National Geographic Society which has made it available to us for the solar work. Preliminary tests, now in progress, indicate that the spectrograph is capable of studying the spectrum throughout the photographable range, from 3000A to approximately 13,000A.

50. **Measurements of the Absorption of λ 1216A, λ 2050A, and λ 8A Solar Radiation in the Upper Atmosphere.** E. T. BYRAM, T. CHUBB, H. FRIEDMAN AND S. W. LICHTMAN, *U. S. Naval Research Laboratory, Washington, D. C.* (15 min.)

Solar radiation in the neighborhood of the Lyman α -line of hydrogen at λ 1216A and in the atmospheric window between the ozone and molecular oxygen absorption bands near λ 2050A was measured by means of photon counters flown in three Aerobee rockets which were fired at W.S.P.G. during May, 1952. Intensities measured with a photon counter sensitive to a band of wavelengths from 1180A to 1300A varied with altitude according to Beer's law with an absorption coefficient of about 0.005 cm⁻¹ of air (base *e*), indicating that HL_{α} contributed all of the solar radiation in the measured band within the accuracy (± 10 percent) of the measurement. In all three flights HL_{α} was first detected at altitudes of 74 ± 2 km (18° – 20° sun elevation). Measurements near λ 2050A showed clearly the effect of ozone absorption below 38 km and indicated a total of approximately 0.3 mm of ozone between 30 and 38 kilometers. Above 38 km, the absorption appeared to be entirely the result of the O₂ content of the air with a coefficient of about 2.9 km⁻¹ (base *e*). The intensity of solar radiation in the neighborhood of 2050A corresponded to a sun temperature of $5300^\circ \pm 300^\circ\text{K}$. X-rays were detected above 90 km confirming the previous observation¹ of a high energy limit to the solar spectrum near 7A.

¹ Friedman, Lichtman, and Byram, *Phys. Rev.* **83**, 1025 (1951).

51. **The Reduction of Contrast by Atmospheric Boil.*** SEIBERT Q. DUNTLEY, WILLIAM H. CULVER, FRANCES R. CULVER, AND RUDOLPH W. PREISENDORFER, *Visibility Laboratory, University of California, La Jolla, California.* (20 min.)

Whenever a distant object is observed or photographed through an atmosphere containing thermal refractive inhomogeneities (boil), the path of sight is deviated in an erratic manner. Object light received from any specified direction originates from a given area of the object only part of the time, light from adjacent areas occupying the path of sight during the remainder of the time. Some of the temporal variations are slow enough to be discernible, but many of them are

so rapid that only their time-averaged effect is important. The time-averaged apparent luminance of each point in the field of view is affected and the time-averaged apparent contrast of the object is reduced. A theoretical treatment of this effect has been evolved. It is based upon the hypothesis that the path of sight may be divided into sections within which the optical effects of the boil are uncorrelated. It follows that the probability of receiving light from any point of the object follows a normal Gaussian distribution peaked at the center of the path of sight. Experimental verification of this result has been obtained. Expressions for the time-averaged apparent contrast of targets of various shapes have been derived. For example, at the center of a circular disk of angular radius ψ , the time-averaged apparent contrast \bar{C} is related to the contrast C which would prevail in the absence of atmospheric boil by the relation $\bar{C} = C[1 - \exp(-\psi^2/A)]$, where A has been called the *optical air-state*, and is related to statistical (random-walk) parameters by the relation $A = \alpha^2 N$, where α is the angular step and N is the number of steps. The apparent contrast of any point located at an angle ϕ from the center of the disk is

$$\bar{C}_\phi = C \left\{ \sum_{i=0}^{\infty} (\phi^2/\alpha^2 N)^i \Gamma[\psi^2/\alpha^2 N; (i+1)] \right\}.$$

From relations of this type it is possible to calculate the distribution of apparent contrast and the distribution of apparent luminance throughout an entire scene if the distribution of inherent contrast is specified and if the contrast reduction factor for any point of the scene is known.

* This research was supported by the ONR through contract N5 ori-07864.

FRIDAY, OCTOBER 10, 2:00 P.M.

Parlors A and B

Contributed Papers

52. **Equivalent Films in Optical Filters.** L. IVAN EPSTEIN, *Bausch & Lomb Optical Company.* (15 min.)

A symmetrical thin-film combination is equivalent to a single film, characterized by an equivalent index N and thickness γ . This can be proved from Herpin's theorem.^{1,2} Both N and γ depend on wavelength. Their values have been calculated for some frequently used combinations. They are imaginary in certain spectral regions. In these regions, a periodically stratified medium with the given combination as a period has a high reflectance band. Elsewhere, N may be higher than the index of any known material, or it may be less than 1. A film of very extreme index or dispersion may therefore be simulated by a symmetrical thin-film combination, and this may be used in place of the required film in a more complex design. Applications of such equivalents to antireflection coatings and band-pass filters will be described.

¹ A. Herpin, *Compt. rend* 225, 182 (1947).

² F. Abeles, *Rev. optique* 28, 279 (1949).

53. **Complex Impedance of Conducting Thin Films.*** CARL E. DRUMHELLER, *University of Illinois.* (30 min.)

A new point of view is proposed to account for the observed optical characteristics of conducting thin films without the necessity of postulating any unusual or anomalous frequency dependence of resistivity. By considering the complex impedances associated with the structure of such films it is possible not only to account theoretically for their observed optical behavior, but important new information concerning the structure can be derived from simple electrical and optical measurements. The transmission of conducting thin films in the infrared is considered in detail. In general a high resistance film has an associated parallel reactance, and a low resistance

film has a series reactance. Measurements on evaporated bismuth films indicate that those in the resistance range of 10,000 to 50,000 ohms per square have a parallel capacitance of about 2.5×10^{-6} micromicrofarad per square. Those evaporated to a resistance of 90 ohms per square have both parallel and series capacitances of about 3.8×10^{-5} micromicrofarad per square. These results can be explained satisfactorily if one assumes that the resistance is contributed primarily by the grain boundaries between adjacent bismuth crystals and that a wide variation exists in the grain-to-grain resistances. This conclusion is also consistent with electron micrograph observations of the oxidation process of bismuth films.

* Supported by Air Research and Development Command under Contract No. AF33(038)-21255.

54. **Bright Multiple Beam Interference Fringes in Reflection.** F. DOW SMITH,* *Institute of Optics, University of Rochester, Rochester, New York,* AND A. F. TURNER, *Bausch & Lomb Optical Company, Rochester, New York.* (15 min.)

When a test glass coated with a highly reflecting semi-transparent metallic or all-dielectric multilayer film is placed over a highly reflecting surface, the sharp interference fringes obtained in reflected light are dark on a bright background. Lummer¹ performed an experiment in which sharp bright fringes were obtained in reflection by mechanically suppressing the first of the multiply reflected beams. In the present work this is done optically by means of multilayer coatings which give the test glass a high first surface and low second surface reflectance. The introduction of absorption is fundamental to obtaining the result. One of the examples to be described is an asymmetrical interference filter for which the contrast of sharp fringes changes completely with a 10 m μ shift in wavelength. A second more practical solution consists of the combination Glass-Inconel-LHLH, where L and H denote quarter wave layers of MgF₂ and ZnS, respectively. Samples have been made having a maximum first surface reflectance of 85 percent and minimum second surface reflectance of practically zero in the green for Inconel with a transmittance of 35 percent at 435 m μ . Applications to interference filters will also be discussed.

* Now at Boston University Optical Research Laboratory.

¹ O. Lummer, *Sitz. Akad. Wiss. Berlin* 1, 504 (1900).

55. **The Use of Wire Gratings as Polarizers.*** C. W. PETERS AND W. K. PURSLEY, *University of Michigan.* (15 min.)

Hertz¹ demonstrated that wire gratings, having a grating space much smaller than the wavelength, transmitted freely vibrations with the electric vector oriented perpendicular to the wire direction, and were opaque to the parallel component. Later, du Bois and Rubens² measured the polarization of several wire gratings at a number of wavelengths in the infrared. Since that time apparently no use has been made of such polarizers, although they have a number of advantages over the common dielectric types. The phenomenon has been reinvestigated by the use of 3-cm microwaves and shows a great complexity of effects depending upon the ratio of the grating space to wavelength, the ratio of the opaque to clear widths, the orientation of the grating, etc. Results of attempts to construct polarizers for the infrared will be given.

* Supported in part by the Army Engineers Corps.

¹ H. Hertz, *Electric Waves* (Macmillan and Company Ltd., London, 1893), p. 177.

² du Bois and Rubens, *Ann. Physik* 35, 243 (1911).

56. **Wide Pass Band Multilayer Filters.** A. F. TURNER, *Bausch & Lomb Optical Company, Rochester, New York.* (10 min.)

Interference filters with wide pass bands may be designed with multilayer films of nonabsorbing materials. Two identical highly reflecting stacks of quarter-wave films of alternately high and low refractive index are separated by a half-wave

spacer film. Identical phase compensating film combinations are added to each outside face of this filter. As the wavelength is varied about the center of the pass band, the phase compensators retard the change of phase between successive interfering transmitted beams which arise from multiple reflections between the two stacks. Thus the pass band is broadened. If the phase compensators maintain approximately a retardation of 360° between the multiples over a given spectral region, a square-topped pass band with practically complete transmittance results. A simple phase compensating film combination consists of a half-wave film adjacent to the stack followed by one or more quarter-wave films, the specific design depending on the parameters of the stacks. By using films of indexes 1.38 and 2.3, square topped filters, centered for example at 500 m μ , may be made with half-widths in the range 40-100 m μ .

57. **The Doberly Screen.** V. J. DOBROLIUBOFF (DOBERLY). (10 min.)

A recent lifting of a ban by the Government of the United States on manufacturing and marketing the products of the latest advancements and developments in color television makes it timely to bring to general attention the invention made by Mr. V. J. Doberly in 1950 of a perfect large-size projection television screen. Inasmuch as the procedure of patenting this screen has not yet reached the state of safe open disclosures, only a few details of the final tests are given in this abstract. According to these tests, made at Mt. Vernon, New York, in December, 1950, by the North American Philips Company's engineer, Mr. W. Manning, this screen has perfect resolution of the image projected through it throughout its entire extension, and it maintains this perfection far beyond the requisite viewing angle of 60°. The light output of the screen falls off quite reasonably and uniformly with the increase in horizontal viewing angle. Its total transmission of light is 60 percent.

In fact the characteristic of the sidewise light distribution of this screen is very close to that of the very best known cinema screens of reflection type.

58. **Transparent Luminescent Screens.** D. A. CUSANO AND F. J. STUDER, *General Electric Research Laboratory, Schenectady, New York.* (15 min.)

Transparent coatings of a number of luminescent materials have been deposited on glass surfaces by chemical reaction of the components in the vapor state.¹ The best of these so far obtained are ZnS:Zn which gives a blue emission, and ZnS:Mn which emits yellow orange under cathode-ray excitation. The ultraviolet response of these films is in general very slight, but varies with the conditions of preparation. The optical absorption appears to be identical with evaporated zinc sulfide films. The basic process of producing a transparent layer of zinc sulfide phosphor is to bring together zinc and manganese vapor at a heated glass surface (500-600°C) in an atmosphere of H₂S (1- to 2-mm pressure). The efficiency of response under cathode rays is dependent of many factors. Typical ZnS:Mn films give from 5 to 10 foot-Lamberts for a current density of 1 microampere per sq cm at 10 kv. Chemical analysis of a few samples indicate about 1 percent manganese present in these coatings. Zinc sulfide coatings produced by vapor reaction are very firmly bonded to the glass and show no tendency to craze when left exposed indefinitely to the atmosphere, even in thicknesses up to 5 microns.

¹ Studer, Cusano, and Young, *J. Opt. Soc. Am.* 41, 559 (1951).

59. **Excitation of the Zinc-Oxide Phosphor by Low Energy Electrons.** R. E. SHRADER, *Radio Corporation of America,* AND S. F. KAISEL, *Stanford University.* (15 min.)

Measurements on the luminescence of a ZnO[Zn]-screen, excited by electron impact, have been made with applied

voltages, between cathode and screen, in the range 0-135 v. Luminescence is detectable as low as 2.5 volts. When account is taken of contact potentials and thermal electron velocities, the indications are that luminescence occurs even when the bombarding electrons have kinetic energy (in vacuum) which is very near zero (<0.1 ev), although the emitted radiation contains photons ranging in energy from 3.0 to 1.8 ev. A mechanism is proposed to account for this and other observed phenomena.

FRIDAY, OCTOBER 10, 7:30 P.M.

Georgian Room

Informal Dinner

For Members of the Optical Society and Guests

Following the dinner, the Ives Medal for 1952 will be bestowed on Dr. Ira S. Bowen, and the Adolph Lomb Medal for 1952 will be bestowed on Dr. A. B. Meinel. The dinner speaker will be Dr. Harlow Shapley, of the Harvard College Observatory.

Through the courtesy of the American Optical Company, those attending the dinner are invited to a Cocktail Party in Parlors A and B between 6:30 and 7:30 P.M.

SATURDAY, OCTOBER 11, 9:00 A.M.

Georgian Room

Ives Medal Address

The Frederic Ives Medalist for 1952, Dr. Ira S. Bowen of the Mount Wilson and Palomar Observatories, will present an address entitled, "Optical Problems at the Palomar Observatory."

SATURDAY, OCTOBER 11, 9:45 A.M.

Georgian Room

Symposium of Invited (25-Minute) Papers

60. "The Use of Automatic Calculating Machines on Problems of Optical Design." JAMES G. BAKER, *The Perkin-Elmer Corporation and Harvard College Observatory.*

61. "High Speed Arithmetic: The Digital Computer as a Research Tool." H. R. J. GROSCH, *General Electric Company.*

62. "The Optical Theory of Flying Saucers." DONALD H. MENZEL, *Harvard College Observatory.*

63. "Some Unusual Upper-Atmosphere Phenomena and Their Causes." ALLEN HYNEK, *Ohio State University.*

64. "Some Unusual Observations in the Earth's Atmosphere." URNER LIDDEL, *Atomic Energy Commission.*

SATURDAY, OCTOBER 11, 9:45 A.M.

Parlors A and B

Contributed Papers

65. **Direct Evaluation of Nonperiodic Variations in Diffraction Gratings by a Phase Contrast Method.*** GEORGE STROKE, *Massachusetts Institute of Technology.* (10 min.)

Diffraction grating ruling errors of an essentially non-periodic nature are being studied quantitatively with an

apparatus combining new features with the use of the Françon-Nomarski¹⁻³ phase plate. Some resemblance can be found with a method first suggested by H. S. Allen in 1902.⁴ Two masks are made to slide directly in front of the phase plate on each side of a strong line of a spectrum focused on the plate. By progressively unmasking the "ghost halo" starting from the center of the line, various new regions of the grating light up more or less brilliantly when observed through a telescope or photographed in monochromatic light which has been reflected from the phase plate. The distance of each mask edge from the center of the line is proportional to the relative local variation of the average grating constant of the newly appearing regions. The fraction of the surface constituted by the groups of grooves lighting up for each mask position is noted, as is the limit position on each side after which no new regions brighten up. Errors as small as 1/100 fringe are easily measurable with the present apparatus.

* This work was supported in part under AEC Contract AT(30-1)-1283.
¹ M. Françon et G. Nomarski, *Compt. rend.* **230**, 1392 (1950).
² Camus, Françon, Ingelstam, and Maréchal, *Rev. optique* **30**, 3 (1951).
³ E. Ingelstam and Djurle, *Arkiv Fysik* **4**, No. 11 (1951).
⁴ H. S. Allen, *Phil. Mag.* **3**, 92 (1902); *ibid.* **6**, 559 (1903).

66. Spectral Radiance of the Low Current Carbon Arc from 7500A to 2200A. DONALD M. PACKER AND CHARLES LOCK, *Naval Research Laboratory*. (15 min.)

Measurements from rockets of the solar ultraviolet energy distribution have been made by spectrophotographic comparison of the solar radiation with that from the positive crater of a McPherson type direct-current carbon arc. Extension of the solar spectrum to 2200A required detailed calibration of the arc spectrum below 2500A. This calibration was made by measuring the crater radiation, after dispersal by a Hilger-Mueller quartz double monochromator of measured transmittance, with a 935 phototube calibrated for spectral response against a thermopile. Spectral band widths used varied from 9A at 2200A to 14A at 2500A. The energy distribution was also measured up to 7500A. Between 2650A and 7500A, the distribution of the crater radiation was equivalent to that from a blackbody at 3800°K; below 2650A, the strong arc-stream radiation was superposed on the crater thermal radiation. The brightness temperature of the positive crater, measured at 6500A, was 3785°. Measurements were also made of the arc-stream radiation only and will be reported. It was concluded that the carbon arc is a satisfactory standard radiator from 7500A to 2200A, excluding the region of cyanogen radiation between 3450A and 4250A.

67. Performance of a Recording Vacuum Ultraviolet Spectrometer. L. W. TAYLOR, H. D. BURNHAM, AND L. C. JONES, *Research Laboratory, Shell Oil Company, Wood River, Illinois*. (10 min.)

A Baird grating monochromator¹ has been adapted for recording the absorption spectra of gases and liquids over the 1500-4000A region. A windowless hydrogen discharge tube similar to that of Tousey² but operated on 60-cycle alternating current serves as light source, and an RCA C-7139 quartz envelope photomultiplier tube³ as detector. The 120-cycle signal from the photomultiplier is fed to a sharply tuned 120-cycle amplifier, is rectified, and recorded. By appropriate baffling, spectral purity greater than 99.9 percent has been achieved over the entire region. Satisfactory signal to noise ratio is obtained for spectral slit widths of 1.7A. The instrument is currently being used in a survey of the vacuum ultraviolet spectra of unsaturated hydrocarbons. Vapor spectra of oxygen and of the C₄ olefins and diolefins will be presented to demonstrate the quality of results obtained with the equipment.

¹ Tousey, Johnson, Richardson, and Toran, *J. Opt. Soc. Am.* **41**, 696-698 (1951).

² Johnson, Watanabe, and Tousey, *J. Opt. Soc. Am.* **41**, 702-8 (1951).

³ L. Dunkelman and C. Lock, *J. Opt. Soc. Am.* **41**, 802-804 (1951).

68. The Use of an Echelle Spectrograph in the Investigation of Zeeman Spectra. P. M. GRIFFIN, R. A. LORING,* AND J. R. McNALLY, JR., *Stable Isotope Research and Production Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee*. (20 min.)

An echelle spectrograph, designed and assembled in this laboratory, has proved to be a very powerful tool in the study of Zeeman spectra. The dispersion of a 200-lines-per-inch, *r/2* echelle† is crossed with that of a large Littrow spectrograph. The design and performance of this instrument, which has exhibited a resolving power of 300,000 at the 4358A line of mercury, is discussed. Many features of the echelle¹ make it ideally suited for use in Zeeman spectroscopy—e.g., its inherently high resolving power and dispersion, high speed, broad spectral coverage in a single exposure, and compactness. These permit the use of weaker magnetic fields, smaller samples, shorter exposures, and location of the spectrograph at the magnet or other experimental site. Although the resolving power varies inversely with the wavelength, the resolving limit expressed in wave numbers is constant throughout the spectrum. This points to the very desirable property that the minimum observable magnetic splitting, Δg , as limited by instrumental resolving power, is constant throughout the spectrum. Some results of investigations of the Zeeman spectrum of uranium and neon with this instrument are discussed.

* Research Participant, University of Louisville, Louisville, Kentucky.

† This paper is based on work performed for the AEC by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, Oak Ridge, Tennessee.

‡ The echelle was obtained from Bausch & Lomb Optical Company, Rochester, New York.

¹ G. R. Harrison, *J. Opt. Soc. Am.* **39**, 522 (1949).

69. The Determination of Interferometer Spacings for the Best Resolution of Perot-Fabry Patterns. G. DEVERALL, K. W. MEISSNER, AND G. ZISSIS, *Purdue University*. (10 min.)

The overlapping of orders in complex Perot-Fabry patterns sometimes renders wavelength determinations more difficult. A discussion of the conditions for optimum resolution of a given close line aggregate leads to a simple graphical method which facilitates the selection of proper interferometer spacings.

70. Calculation of Integrated Intensities in Spectrographic Microanalysis. J. K. HURWITZ, *Mines Branch, Ottawa, Canada*. (20 min.)

A method has been developed for calculating the integrated intensity recorded on the photographic plate during a traverse of a region in which a high concentration gradient exists.¹ Three separate assumptions regarding the shape of the sparked volume were made, *viz.*, a circular disk of uniform thickness, a cap of a sphere, and a paraboloid of revolution. The calculated traverse curves based on these assumptions were compared with experimental traverse curves. The disk gave good agreement only if the sample speed was sufficiently high. The latter two shapes were satisfactory for all practical conditions. It is suggested that this technique may easily be extended to the analysis of segregates in metals and alloys even though the segregate may be considerably smaller than the sparked volume. Experimental and theoretical results are shown for artificial and real segregates.

¹ J. K. Hurwitz, *J. Opt. Soc. Am.* **42**, 484 (1952).

71. The Measurement of Wavelengths in Echelle Spectra. NISSON A. FINKELSTEIN, *Bausch & Lomb Optical Company, Rochester, New York*. (20 min.)

Echelle spectrographs produce a two-dimensional array of spectral lines and therefore present a new problem in the determination of wavelengths. One approach to this problem consists of delineation of the spectrum into its component:

cyclic orders and the subsequent identification of an unknown spectral line in terms of its position within its order cycle, using the spectrographic optical axis as a fiduciary line. The relative advantages and disadvantages of a measuring system founded on this approach will be described, and typical spectra will be shown.

72. A Device for Reducing Densitometer Traces to Intensities. J. D. PURCELL, *Naval Research Laboratory*. (15 min.)

The conversion of a densitometer trace into a curve of log intensity is accomplished through the *H* and *D* curve. A simple device was constructed to perform automatically the laborious task of conversion. The method consists of contact printing directly through the densitometer trace onto sensitized paper using a moving slit light source. The slit is parallel to the wavelength axis and scans along the density axis. The sensitized paper moves past the slit at constant speed. The motion of the densitometer trace relative to the paper is controlled by a template cut from the *H* and *D* curve. Thus all points of the trace having the density value appropriate to the instantaneous position of the slit are recorded on the paper at the proper value on a log *I* scale. The equipment as constructed accommodates a trace 20 inches long. A wavelength range of about 100A usually can be covered by a single template and scan. The exposure is made in 30 seconds and the whole conversion of a trace, no matter how complicated, can be completed in ten minutes. The result is an accurate trace of log *I* vs wavelength. A second step with a logarithmic template produces a linear intensity trace.

SATURDAY, OCTOBER 11, 2:00 P.M.

Georgian Room

Contributed Papers

73. Colorimetry of Bronze Paints. W. E. K. MIDDLETON AND A. G. MUNGALL, *National Research Council of Canada, Ottawa*. (15 min.)

In order to be able to compare bronze paints with ordinary standards such as Munsell papers, it is necessary to establish conditions of illumination and viewing which will render the metallic reflection inconspicuous. It has been found that completely diffuse illumination and normal viewing are highly satisfactory, and a small integrating sphere has been constructed which enables the comparison to be carried out with relative ease. The colors of 24 samples, measured in this way, correlate closely with those calculated from measurements on a recording spectrophotometer with the specular component included.

74. The Absolute Spectral Diffuse Reflectance of Magnesium Oxide in the Near Infrared. C. L. SANDERS AND W. E. K. MIDDLETON, *National Research Council of Canada*. (15 min.)

The work of Middleton and Sanders¹ was extended in the near infrared to 2.4 μ using a lead sulfide detector and a 13-cycle amplifier. The reflectance of a freshly prepared surface of magnesium oxide decreases gradually from 0.97 to 0.7 μ to 0.94 at 2.4 μ . There are weak absorption bands at 1.4 μ , 1.9 μ , and one just beyond 2.4 μ . The absorption increases with time if the surface is left in the air of an ordinary room, but the increase is checked if the air is dried by phosphorous pentoxide. The bands are probably the result of brucite Mg(OH)₂.² After four days in an ordinary room the reflectance has fallen to 0.92 at 2.4 μ . The variation of reflectance of fresh surfaces is about 0.005. The accuracy of measurement is about 0.002 up to 2.1 μ , decreasing to 0.004 at 2.4 μ .

¹ W. E. K. Middleton and C. L. Sanders, *J. Opt. Soc. Am.* **41**, 419 (1951).

² Yeou Ta, *Compt. rend.* **211**, 467-468 (1940).

75. Thermochromic Properties of the System Ag₂HgI₄-Cu₂HgI₄. PAUL H. KECK AND LAWRENCE SUCHOW, *Signal Corps Engineering Laboratories, Fort Monmouth, New Jersey*. (15 min.)

Ag₂HgI₄ and Cu₂HgI₄ are known to undergo an abrupt change from an ordered structure into a disordered state at the transition temperatures 50.7°C and 67°C, respectively.¹ This transition is accompanied by a change in color. It has been found that solid solutions of both compounds can be prepared by simultaneous precipitation from aqueous solutions. The color transition temperatures of these materials have been determined as a function of composition. The results have led to the construction of a phase diagram which is consistent with x-ray diffraction studies. A considerable hysteresis of the transition temperatures has been observed. A consequence of this behavior is that within certain ranges of composition and temperature the ordered phase as well as the disordered one are stable. Munsell color notations and spectral reflectance measurements have been made for both the high and low temperature phases. All reflectance curves are similar in character and exhibit a very distinct step with about 5 percent reflectance on the side of short wavelengths and about 50 percent reflectance in the red. It has been found that the shift of the reflectance edge occurring with the color transition corresponds to a constant energy difference of about 0.18 electron volt.

¹ J. A. A. Ketelaar, *Trans. Faraday Soc.* **34**, 874-882 (1938).

76. Permanent Glass Color Standards for Maple Sirup and Honey. B. A. BRICE AND A. TURNER, JR., *Eastern Regional Research Laboratory, U. S. Department of Agriculture, Philadelphia 18, Pennsylvania*. (15 min.)

For many years the color of maple sirup has been classified with standardized caramel-glycerin solutions, and that of honey with the Pfund wedge comparator. These solutions are unstable and the wedge comparator is not practical for field use. Simple inexpensive color comparators equipped with permanent glass color standards accordingly have been developed. The colors of fresh caramel-glycerin solutions, representing the previous color standards, were duplicated with selected amber glasses ground and polished to proper thickness. Spectrophotometric data, and color specifications and tolerances based on the I.C.I. coordinate system, are presented. A complete grading set for maple sirup consists of three glass color standards mounted in alternate windows of a metal box comparator, square bottles of 31.5-mm internal thickness for holding samples, three similar bottles of colorless liquid for placing behind the color standards as blanks, and three bottles of turbid suspensions to replace the clear blanks when cloudy sirup is being graded. The system for extracted honey is similar except that two comparators are required for the six glass standards. These new official color standards and grading sets are commercially available and are in use by producers, processors, buyers, and government inspection agencies.

77. Color Gamut of Artists' Oil Colorants. WALTER C. GRANVILLE, *Container Corporation of America*. (15 min.)

The maximum color gamut of two series of Shiva artists' oil colorants has been investigated by making spectrophotometric measurements on six-step letdowns of each colorant individually with white and black and plotting their chromaticity coordinates on the CIE mixture diagram. The pair of loci obtained by joining each colorant with white and black defines constant colorant hue. In one series¹ made with pure pigments used singly, some loci approximated constant Ostwald hue (constant dominant wavelength), others constant Munsell hue, while the balance showed a significant reverse curvature to the loci defining constant Munsell hue. The other series² containing eight colorants, two blacks, and one white

was developed to simplify color matching to the Ostwald system charts.³ Each colorant and black was made of a blend of pigments designed to produce mixture loci approximating constant Ostwald hue when used with white and the designated black. The loci of each colorant plotted on the CIE and Ostwald chromaticity diagrams will be shown. These may simplify color matching with artists' colorants. The results also are interpreted as evidence that the word "hue" should be applicable to all three concepts, Munsell, Ostwald, and colorant hue.

¹ Shiva signature permanent artists' oil colors, Shiva Artists' Colors, Chicago (1950).

² Shiva signature permanent artists' oil colors based on the Ostwald system, Shiva Artists' Colors, Chicago (1950).

³ *Color Harmony Manual* (Container Corporation of America, Chicago, 1948), third edition.

78. Propagation of Errors in Spectrophotometric Colorimetry. ISADORE NIMEROFF, *National Bureau of Standards*. (10 min.)

Most of the investigations in color and color specification have dealt with visual sensitivity to color stimuli. A fundamental part of spectrophotometric data, on which instrumental colorimetry is based, has been neglected. This part is the uncertainty of measurement of spectral data, resulting from recurrent and random fluctuations such as slit width and stray energy effects, lack of reproducibility between instruments, and lack of repeatability on the same instrument. Use of the theory of error propagation in computed results¹ leads to an expression by means of which one can determine the uncertainties in computed CIE chromaticity coordinates resulting from known uncertainties of spectrophotometric data. On the assumption that the uncertainty is of constant magnitude, a simpler expression for the chromaticity coordinate uncertainties is developed, independent of the spectral curve. These chromaticity uncertainties may be compared with the visual perceptibility data of MacAdam.² As in visual colorimetry, an instrumental measurement of chromaticity coordinates does not establish a single point on the chromaticity diagram, but rather indicates that the true chromaticity point probably lies within an approximate elliptical area surrounding this point.

¹ A. G. Worthing and J. Geffner, *Treatment of Experimental Data* (John Wiley and Sons, Inc., New York, 1943).

² D. L. MacAdam, *J. Opt. Soc. Am.* 32, 247 (1942).

79. The Size of Acceptable Color Differences. HUGH R. DAVIDSON,* *Central Research Laboratory, General Aniline and Film Corporation, Easton, Pennsylvania*, and ELAINE FRIEDE, *Alexander Smith, Inc., Yonkers, New York*. (20 min.)

In order to determine the size of acceptable color differences for a particular production problem, about 12,000 individual judgments of the acceptability of some 300 samples as matches with 19 standards were made. The samples represented colors in all sections of the color domain, and the samples represented various size color differences from the standards. Colorimetric measurements of the samples were made and plotted in the standard C.I.E. space. Ellipsoids were then drawn around each standard in such a manner as to include as nearly as possible all samples considered to be acceptable in 50 percent of the observations and to exclude all others. The ellipsoids so determined were found to have radius vectors of about 2½ times those of the MacAdam ellipses in the chromaticity plane, and to have a radius vector of about 0.15 Munsell value units parallel to the y axis. Color differences were calculated according to the several methods currently in use and plotted against the visual judgments of acceptability. Calculations based on rather small modifications of the MacAdam ellipses were found to correlate with the visual results much better than do those based on other methods.

* Present address, Davidson and Hemmendinger, R.D. No. 1, Easton, Pennsylvania.

SATURDAY, OCTOBER 11, 2:00 P.M.

Parlors A and B

Contributed Papers

80. Conrady's Chromatic Condition.* DONALD P. FEDER, *National Bureau of Standards*. (20 min.)

Nearly fifty years ago Conrady¹ published a very simple and ingenious formula for determining the state of chromatic correction of an optical system. This method, sometimes called the "D-d achromatism," depends upon considerations of the optical path as a function of wavelength. It is sufficient to solve nearly all the achromatization problems of an optical system, including the evaluation of axial and lateral color, chromatic variation of spherical aberration, and secondary spectrum. Recently, however, the author has become convinced upon talking to other lens designers that the method is not as widely used as it deserves to be in view of its utility and simplicity of application. Possibly the reason for its neglect was the lack of clarity and rigor in the original and succeeding proofs and the absence of a discussion of the region of validity of the formula. This paper will give a valid proof, will point out the principal applications, and will present some numerical examples showing the accuracy obtainable by the formula.

* Research supported in part by the U. S. Air Force and U. S. Army Signal Corps.

¹ A. E. Conrady "On the chromatic correction of object glasses," first and second papers, both in Volume 64, *Monthly Notices of the Royal Astronomical Society*.

81. Zonal Aberration Patterns of Long Focal Length Single Lenses. A. I. MAHAN AND H. A. TEMPLIN, *Naval Ordnance Laboratory*. (20 min.)

Single lenses of long focal length were used to obtain large zonal patterns which were readily observed. These zonal patterns were photographed at different distances from the lenses so that the changes in form with distance could be seen readily. Lenses of different designs were subjected to the same tests to see how the design influenced the behavior of these zonal patterns. The zones of light transmitted by these lenses were both circular and rectangular in shape. Some very interesting geometrical figures can be obtained in this way. The third-order methods of L. Seidel were then used to calculate the forms of some of these patterns in the paraxial image plane and a comparison made between the observed and calculated forms. The forms of these zonal patterns and their changes with distance from the lens will be demonstrated by projection methods.

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L. Seidel, *Astr. Nachr.* Nos. 1026-1029 (1856).

82. A Derotation Prism for Strongly Convergent Light. ROBERT A. WOODSON AND WILLIAM E. GOETZ, *International Business Machines*. (15 min.)

A derotation prism recently invented by G. Alf Malmros* is superior to the Schmidt prism in several respects. Entrance and exit faces are normal to the optical axis. The properties of the Malmros prism are referred below to those of the Schmidt, assuming LF-2 glass and assuming that the entrance and exit apertures are all equal. The maximum field angle is 228 percent. The number of reflections is 60 percent. The number of total internal reflections is 100 percent. The number of metallic reflections and the reflection loss are 50 percent. Glass path and absorption loss are 42 percent. Length is 120 percent. Height is 100 percent. Width is 55 percent. Volume and weight are 49 percent. Axial moment of inertia is 31 percent. The Malmros prism consists of three elements, two of

which are identical. It has a virtual meridional baffle extending along 60 percent of the air equivalent optical tunnel, which vignettes the edge of the field 68 percent in one application. If made of 1.5-index glass this prism does not shift the image axially.

* International Business Machines.

83. The Generation of High Aperture Parabolic Surfaces of Revolution. R. E. LEWIS, *Schneider-Cogswell, Inc.*, H. T. BETZ, *Armour Research Foundation*, N. W. RODELIUS, *Armour Research Foundation*, and M. WOLFSON, *Revere Camera Company*. (10 min.)

A process has been developed to enable the production of high aperture parabolic surfaces of revolution with little or no hand retouching. An approximately parabolic blank is ground by stroking it with a thin blade held parallel to the axis of rotation. The blade carriage consists of a vertical-motion parallelogram using thin flexing plates as bearings. This assembly is carried on a horizontal-motion parallelogram which swings on an arc equal to the spherical approximation of the parabolic curve. The horizontal swing reduces the vertical motion required to the difference between the sphere and parabola, thus reducing the tendency toward grooving and chattering. Polishing may be accomplished on the machine by a blade of pitch-impregnated felt.

84. A New Line Board Test for Paraboloidal Reflectors. WILLIAM LIBEN* AND BENJAMIN GOLDBERG, *Engineer Research and Development Laboratories, Fort Belvoir, Virginia*. (20 min.)

A theoretical analysis is made of the Tschikolew, or line board test, for paraboloidal reflectors. This test has been used for many years as an indication of the quality of a paraboloidal reflector by virtue of the fact that a straight line is apparently imaged as a straight line if the reflector is perfect. It is shown that a straight line actually is imaged as a curve, but that if necessary test conditions are satisfied, the image can be approximated by a straight line. Because of the deficiencies of the Tschikolew straight-line test, a circular-line board test

has been developed which utilizes a pattern of concentric circles. If the paraboloidal reflector is perfect, these circles are imaged as circles. Theoretical analysis indicates that, if the reflector is defective in any way, the image circle will be distorted. This distortion can be measured to determine the amount of deviation from the true paraboloid. Whereas the Tschikolew test is qualitative because of the difficulty in using it quantitatively, the circular-line board is shown to be suitable for simple quantitative work. The circular line board test can be made extremely sensitive by certain adjustments so that very small reflector defects can produce very large distortions in the image circle.

* Now at the Applied Physics Laboratories, Silver Spring, Maryland.

85. A Large Range Variable Magnification Telescope. FRANK G. BACK, *The Zoomar Corporation*. (30 min.)

Telescopes which allow a change of magnification of 3 to 1 linear or 10 to 1 in area are well known. A new telescopic system with variable magnification will be demonstrated which has a range of angular magnification of 10 to 1 or a variation of area covered of 100 to 1. The apparent angle of field is 53°. During the changes in magnification the focal deviation is negligibly small and well within the accommodation range of the human eye.

Acknowledgment

The arrangements for this meeting have been in charge of a committee consisting of:

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 Zissis, G.—see Deverall, G. and K. W. Meissner

THE OPTICAL SOCIETY OF AMERICA

Incorporated



Purpose and Scope

THE OPTICAL SOCIETY OF AMERICA is a national organization devoted to the advancement of optics and the service of all who are interested in any phase of that science—be it fundamental research, the manufacture of optical instruments and products, or the application of optical technics to any of various purposes in science and industry.

The activities of the Optical Society, its meetings, and the contents of its Journal will be found to be of interest and service to an extensive and diverse clientele:—physicists, chemists, biologists, psychologists, ophthalmologists, optometrists, astronomers, spectroscopists, mineralogists, artists, illuminating engineers, manufacturers, and various technologists who are concerned with the application of optical methods. It solicits the support and membership of all persons “interested in optics” whatever the specific interest may be.

Applications for Membership

All persons desiring to join the society or cooperate with it in any way are invited to communicate with the secretary.

Detailed information concerning the society, classes of membership and dues, and membership application blanks may be obtained at the registration desk at any time during this meeting.

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1951–1953

The directors consist of the president, the vice president, the secretary, the treasurer, the junior past president, the editor of publications, and the Secretary for Local Sections, as ex-officio members; and four directors-at-large.

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For further information, address the secretary.

ARTHUR C. HARDY,
Massachusetts Institute of Technology,
Cambridge 39, Massachusetts.

RAYMOND E. SEIDEL M. D.
1801 PORTER STREET
PHILADELPHIA 45, PENNA.

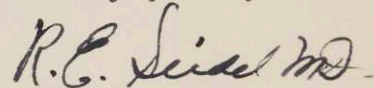
October 16, 1952

Dr. Norbert Wiener
Professor of Mathematics
Mass. Institute of Technology
Boston, Massachusetts

Dear Doctor Wiener:

I will appreciate a reprint on your recent article
concerning Electronic Drug Injector.

Sincerely yours,



R.E. Seidel, M.D.

RES.rs

[ms 10/20/52]

October 16, 1952

Mr. Bruce B. Barrow
Waaltdorperweg 261
Den Haag, Nederland.

Dear Mr. Barrow:

Fundamentally, the best way of recognizing linearity is to add inputs and see if we add outputs. In the presence of a constant noise generated inside the box, when we add inputs we should add outputs except for the residual outputs due to the noise. I have the basis of a theory of non-linear apparatus in which our inputs are of shot effect character, but to realize this apparatus we need a better technique of electrical signal multipliers than we possess at present. If you wish to work with me at M.I.T., I should be very glad to accept this as the subject for a thesis.

Meanwhile, I should suggest very strongly that you pump the Philips people and your other European friends for instantaneous voltage multiplying apparatus which will be accurate, cheap, easily duplicated, and reliable. Anything you can do in this way will be a direct contribution to the thesis I should expect you to work out with me.

Sincerely yours,

Norbert Wiener

hb

October 16, 1952

Mr. W.P. Dolphin
Canadian Marconi Company
2442 Trenton Avenue
Montreal 16, Quebec.

Dear Mr. Dolphin:

As I have been off the problem of the hearing aid which you raise in your letter for some time, I suggest that you get directly in correspondence with Professor Jerome Weisner of our Department of Electrical Engineering at M.I.T. The work continues under his supervision.

Sincerely,

Norbert Wiener

hb

October 16, 1952

Mr. Warner Eustis
The Kendall Company
140 Federal Street
Boston, Mass.

Dear Mr. Eustis:

I shall have my secretary enclose a piece I did in 1950 which defines Cybernetics. My book, Cybernetics, was published by John Wiley and Sons and the Technology Press in 1948.

Thank you for your letter.

Sincerely yours,

Norbert Wiener

hb

Bull. Amer. Acad. of Arts & Sciences. Apr. 1950

[ans 10/17/52]

October 16, 1952

Mr. Dennis Flanagan
Scientific American
2 West 45th Street
New York, New York

Dear Mr. Flanagan:

Our disagreement is about fundamentals, and I see no point to attempting to resume communications between us. So long as scientists are badgered into authorship against their expressed wishes, and so long as their refusal to come across is followed by pressure which may be damaging to them in other than financial ways, but ways which equally represent a form of pressure, I shall be unwilling to participate in the writing of the popular papers. You have had the future of American popular scientific writing very largely in your own hands, and I regret that I have seen fit to enter upon a course of conduct which bids fair to stifle this activity at the source.

Mr. Piel has no existence as far as I am concerned except as your agent, and you have both morally and legally the responsibility for anything that he does in the name of the Scientific American.

Very truly yours,

Norbert Wiener

hb

[ans 10/23/52]

COPY

October 16, 1952

Mr. Serge Fliegers
The Inter Continental Press
130 East 67th St.
New York, N.Y.

Dear Mr. Fliegers:

I shall be happy to talk to you in connection with your article on Cybernetics in The American Mercury.

I can see you Tuesday, Wednesday, Thursday or Friday of next week (Oct. 21, 22, 23, or 24), if this will fit your plans. I hope you will get in touch with me as to which day will be most convenient. Please do so as soon as possible, since I have a good many other obligations at this time and must operate on a first-come-first-served basis.

Sincerely yours,

Norbert Wiener

hb

[ans 10/21/52]

October 16, 1952

Miss Joanne Gilbert
Holmes Hall
Radcliffe College
Cambridge 38, Mass.

Dear Miss Gilbert:

I have tried without success to reach you ty telephone several times, and now I shall try by post and hope to be more fortunate.

I left a message for you some time ago asking you to call me if a radio interview with Professor Wiener on the evening of October 30 would fit your schedule. I did not hear from you, and I have not been able to reach you myself to confirm this date. Professor Wiener's quota of engagements for that week has now been filled, and he will not be able to come to Radcliffe. I am writing to you in the event that you are expecting him.

If you want to interview Professor Wiener on the Radcliffe radio station in the future, you must make a firm date about a month in advance in order to be sure of his time.

Sincerely yours,

Mrs. George Baldwin
Secretary to Prof. Wiener

h

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
77 MASSACHUSETTS AVENUE
CAMBRIDGE 39, MASS.

Radcliffe
Radio A — Rad. + MIT

Thurs. — 2 weeks — Oct. 16th — ng.

Program 1/2 hr. — or 6

F^o — every. — Ames Hall.

21.4-9268

Thomas Gilbert

~~Gilbert~~

~~Gilbert~~

Oct. 30th?

✓

October 16, 1952

Zeitschriftenverlag
Kurt Klebert
Heinestrasse 29
Wien II, AUSTRIA

Liebe Herr Klebert!

Leider hat der Drang meiner wissenschaftlichen Arbeit mich von den Gehörproblem so völlig abgesondert, dass ich keine Gelegenheit habe, den Fortschritt der neuen Untersuchungen in diesem Gebiet zu beobachten. Darum schlage ich Ihnen vor, meinem Kollegen Jerome Wiesner, Audiesertechnischen Hochschule, direkt zu schreiben. Wenn die von Ihnen gewünschten Nachrichten überhaupt vorhanden sind, wird er bereit stehen, das nötige Ihnen mitzuteilen. Ihre sehr ergebener,

Norbert Wiener

hb

October 16, 1952

Dr. Robert Lindner
Latrobe Apartments
Baltimore 2, Maryland

Dear Dr. Lindner:

I have read your book very sympathetically and I agree with you that one of the curses of modern psychiatry is its facile assumption that passive conformity is the ideal goal of psychoanalytical treatment. I do not believe that this view is held by all psychoanalysts, but it is certainly held by too many. I do not regard any worthwhile Heaven as consisting entirely of contented cows.

More strength to your elbow.

Sincerely yours,

Norbert Wiener

hb

October 16, 1952

G. Ramaswamy
"Komala Vilas"
73, Rashbehari Avenue
Calcutta 26, India

Dear Sir:

I shall look over Elkins' paper. I agree that the study of random processes very often needs filter methods to distinguish the effective part of randomness from that introduced by the method of observation itself.

It may be, with good luck, that I shall come to India next year, and I shall hope we may meet each other if I do come.

Sincerely yours,

Norbert Wiener

hb

October 16, 1952

Dr. Jerome Rothstein
Director, Evans Signal Laboratory
Belmar, New Jersey

Dear Rothstein:

I have already received considerable communication from Dr. Hori, and I think he and his group are doing good work.

I am now busy with Armand Siegel who is working with me in developing the relations between prediction theory and quantum theory.

I am extremely eager to see how your work on information, thermodynamics and life is coming along. Meanwhile, as soon as we have anything in black and white to show you, you will be among the first to receive it.

Sincerely yours,

Norbert Wiener

hb

329 Coventry St.

October 16, 1952

Mr. Morton Schwartz
Hartford, Connecticut

My dear Mr. Schwartz:

There are very few scientific contributions which are at the same time such bombshells that they need to be communicated by telegram, and so fugitive that their impact cannot wait for a letter. Your communication of October 5 has excited my curiosity, and if you now wish to follow it up, I am willing to hear what you have to say.

Sincerely yours,

Norbert Wiener

hb

[ans 10/20/52]

October 16, 1952

Professor L.A. Zadeh
Department of Electrical Engineering
Columbia University
New York 27, New York

Dear Professor Zadeh:

Neither the Research Laboratory of Electronics nor Dr. Wiener himself can identify the paper you inquired about in your letter of October 6. If you can send me any information which further describes it, I shall be glad to do what I can to help you.

Sincerely yours,

Mrs. George Baldwin
Secretary to Prof. Wiener

h

"Seminar in Nonlinear Networks," February 1949.

GENERAL OFFICES
WALPOLE, MASS.

— THE —
KENDALL COMPANY
BOSTON 10, MASS.

EXECUTIVE OFFICES
140 FEDERAL STREET
BOSTON

October 17, 1952

Dr. Norbert Wiener
Department of Mathematics
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Dr. Wiener:-

Thank you for going to the trouble of answering my letter of October 9. I shall take occasion to find out more about Cybernetics.

The definition for which I was searching seems to be the one given in the first paragraph of your communication of March 8, 1950 to the American Academy of Arts and Sciences, namely, "the study of communication and control in machines and living things."

Your helpfulness in giving me a sharp definition for this term is appreciated.

Sincerely yours,



Warner Eustis
Director of Research

rfm

HENRY L. BOCKUS, M. D.
THOMAS A. JOHNSON, M. D.
JAMES L. A. ROTH, M. D.
250 SOUTH EIGHTEENTH STREET
PHILADELPHIA 3, PA.

October 20, 1952.

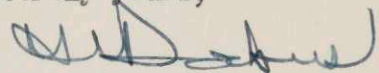
Dr. Norbert Wiener
Massachusetts Institute of Technology
Cambridge, 39, Mass.

Dear Dr. Wiener:

I thank you for your very nice note. I should be very glad to speak to some of my psychiatric friends here about your friend Chafetz, to see if there may be an opening available for him here in Philadelphia. He seemed like a bright enough lad. One of my best friends, who is in charge of the Department of Neurology and Psychiatry at the Graduate School is Dr. Joseph Yaskin. I rather suspect that if Chafetz wished to contact Dr. Yaskin and present his problem, it is likely that he would obtain worthwhile advise.

With best wishes,

Sincerely yours,



H. L. Bockus, M.D.

HLB/d



RECTORIA

Octubre 20, 1952.

Señor Doctor
NORBERT WIENER,
Massachusetts Institute of Technology,
Cambridge 39, Mass.
E. U. A.

Tengo el honor de comunicar a usted que por recomendación del Consejo de Investigación Científica de la Universidad Nacional de México, ha sido designado Huésped de Honor de nuestra Casa de Estudios durante las ceremonias de inauguración de la Ciudad Universitaria.

Los días fijados para las ceremonias de inauguración son el 20 y el 21 de noviembre próximos y en la actualidad se formula el programa de detalle que tendré el placer de enviar a usted a la brevedad posible.

Esperando que usted se sirva honrarnos con su asistencia en estos actos trascendentales para la Universidad Nacional de México, me es grato expresarle mi sincera felicitación por los merecimientos que el grupo científico universitario de México le reconoce, no solamente como hombre de ciencia eminente que ha logrado alcanzar un prestigio internacional en matemáticas sino también como amigo sincero de los investigadores mexicanos a quienes ha brindado tantas veces orientación, estímulo e inspiración.

Me honro en reiterar a usted mi ^{de} más alta y distinguida consideración.

El Rector.

DR. LUIS GARRIDO.

[ans 10/6/52]



CONSEJO TECNICO DE
INVESTIGACION CIENTIFICA

OFICINA DEL
PRESIDENTE

Puente de Alvarado 71
Quinto Piso.

October 20, 1952.

Dr. Norbert Wiener,
Massachusetts Institute of Technology,
Cambridge 39, Mass.
E. U. A.

Dear Dr. Wiener:

I have been given instructions to take care of your problems in connection with your trip as Honor Guest at the dedication of the University City, November 20, 21.

The specific information I need is:

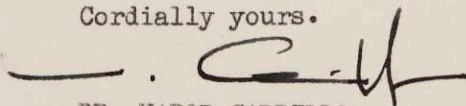
- 1) When do you plan to leave Boston? By what airline?
- 2) When do you want to leave Mexico City?

The Board of Scientific Research of the National University of Mexico, which I have the honor of presiding, will be happy to take care of your hotel and meals expenses in Mexico City.

It is expected that you bring your cap and gown for the academic parade.

Looking forward with pleasure to seeing you soon, I am
(in haste),

Cordially yours.


DR. NABOR CARRILLO.

] ans 11/11/52]

S C I E N C E R E S E A R C H A S S O C I A T E S



Educational and Business Publications • 57 W. Grand Ave., Chicago 10, Ill., WHitehall 4-7552

Oct. 20, 1952

Dr. Norbert Wiener
Department of Mathematics
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Dr. Wiener:

Thanks for your guidance into the literature on
Cybernetics. I have obtained a copy of The Human Use
of Human Beings, and I am finding it very stimulating.

We will be very glad to avoid any public reference to
this correspondence.

Very truly yours,

Frederick Gehlmann, Editor
Tests & Records Department

mw

PHILCO CORPORATION

PHILADELPHIA 34
PENNSYLVANIA

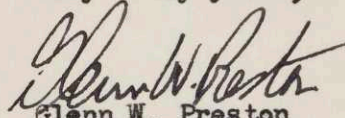
October 20, 1952

Professor Norbert Wiener
Mathematics Department
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Professor Wiener:

Your comments on the enclosed paper would be deeply appreciated.

Very truly yours,


Glenn W. Preston
Research Division

fk
Encl.

[ans 10/29/52]

SHS

% Guenther's Guest House
2327 Pennsylvania Ave., NW
Washington 7, D.C.
Oct. 20, 1952

Dear Professor Weimer,

I was very glad to receive your letter and to hear that your curiosity was aroused, as I hoped it might be.

To continue, then, I will make a further explanation to you of related ideas. May I tell you about "relativity of simultaneity" to begin with?

Well, then, consider the situation again of the railway train and the embankment. As it is given to us, two light flashes occur at A and B at the moment that O coincides with O'. Seconds later, "O" sees the flashes simultaneously; which he

takes us evidence that the flashes are simultaneous. In the meantime, O' has moved a little bit toward B , which is supposed to show us that for O' the flashes are not simultaneous.

But isn't this " O " doing all the reasoning? Suppose O' gets off the train and claims that he too saw the flashes simultaneously? Maybe the flashes met each other at different places at the same time, instead of at different times in the same place? Why have relative time when we can do just as well with a double portion of relative space?

You will want to go further into this, I feel sure. It happens that I have just been transferred from Hartford to Washington, D. C. I began work here just today.

Horton Schwartz



SIMON AND SCHUSTER, INC.

publishers

ROCKEFELLER CENTER, 630 Fifth Avenue, New York 20 • CABLE ADDRESS *Essandess* • TELEPHONE Circle 5-6400

October 20, 1952

Dear Dr. Wiener:

Thank you very much for your suggestions to improve the jacket copy and the note about the author.

Copy is now with the printer, and we should be having proofs in about a fortnight. At that time, I shall make the appropriate changes.

I am delighted to hear that your talks have had such a good reception and that you took occasion to mention the forthcoming book. The more people are looking forward to it, the more we can expect in the way of general interest around publication time.

Very sincerely yours,

Nemy Simon

Dr. Norbert Wiener
Department of Mathematics
Massachusetts Institute of Technology
Cambridge, Mass.

hws:lf

COPY

October 20, 1952

Mr. Harold B. Garland
The Association of Teachers of Mathematics
in New England
129 Houston Ave.
Milton 87, Mass.

Dear Mr. Garland:

Unfortunately, the weekand of December 6 falls between two weeks in which I must give lectures out-of-town which I agreed to do long ago. I must, therefore, decline your invitation to speak. I regret the necessity for doing so, and trust you will understand that only the flesh is weak.

Sincerely yours,

Norbert Wiener

hb

October 20, 1952

Dr. Paul F. Hahn
Meharry Medical College
Nashville, Tennessee

Dear Dr. Hahn:

Professor Wiener has asked me to write to you telling you that he has forgotten what the fate was of the leukemia study on which you collaborated, and he wonders if you will refresh his memory. The latest communication from you which I can find in his files is dated January 22, 1951, and encloses a carbon copy of an abstract submitted to the American Society for Experimental Pathology. Was this abstract published in a Journal of the Society, or was any other paper published elsewhere?

I shall appreciate any help you can give me in learning more about this matter.

Sincerely yours,

Mrs. George Baldwin
Secretary to Prof. Wiener

h

[ans 10/22/52 + 11/17/52]

COPY

October 20, 1952

Mr. J.N.A. Hawkins
1520 N. Santa Anita Avenue
Arcadia, California

Dear Mr. Hawkins:

The phenomenon of AC modulation which you describe is interesting, and I am not well acquainted with the literature in this field. It certainly deserves some study, and the Regohm device of which you speak also deserves some thesis study. At present I am a little off the field as I am working on some quantum mechanical aspects of prediction theory and Cybernetics. However, it is always good to hear from you!

Sincerely yours,

Norbert Wiener

hb

COPY

October 20, 1952

Professor W. Ted Martin
M.I.T., 2-263.

Dear Professor Martin:

I am sorry that I will not be able to stay at M.I.T. working with Dr. Wiener according to our arrangement for the final year with the Rockefeller Foundation. Unfortunately, I am so tied up with my work in Mexico that I cannot take the necessary time off.

I have already notified Dr. Wiener, and we both feel that for the time being our commitment with the Rockefeller Foundation should be terminated, and the final installment returned to them.

I want to thank you very much for your hospitality when I came here three years ago, and I trust that there will be some other opportunity for my coming again in the near future.

Sincerely yours,

Arturo Rosenblueth

hbb

ok - NW (signed)

October 20, 1952

Professor J.J. Nassau
Warner and Swasey Observatory
Case Institute of Technology
East Cleveland 12, Ohio

Dear Professor Nassau:

Thank you for your kind invitation to address the Sigma Xi Chapters of Case and Western Reserve when I'm in Cleveland in December.

I fear I must beg off. I am not as young as I used to be, and a certain amount of the energy I should conserve for my evening lecture would be spent on a noon engagement such as you suggest. The evening lecture is about all I can manage for that one day.

I am appreciative of the honor of your invitation, and I regret I must decline it.

Sincerely yours,

Norbert Wiener

hb

Oct. 20^R

Not sent

Dear Mr. Piel:

I think something is fundamentally wrong with the science publishing business when elaborate plans are made for a program involving the use of an article from me, and the publisher has not the ~~stren~~ straightforwardness to approach me in person but goes through a third party on his say-so that I-~~ea~~ he can secure an ~~article~~ article from me. This is a type of insidious pressure which will always get you or others who use it exactly nowhere.

I have no agent and I have no acquaintances who are entitled to act as my agents, and any attempt on the part of any person to put me in this false position has resulted and will result in his ~~immediate~~ immediate exclusion from my circle of acquaintanceship.

VTY

COPY

October 20, 1952

Dr. Raymond E. Seidel
1801 Porter Street
Philadelphia 45, Pennsylvania

Dear Dr. Seidel:

I should be very happy to ask my secretary to send you a reprint of the article you request, but I am not aware that I have recently written on the subject of an electronic drug injector. Perhaps if you can give me more information I can be of more help to you.

Sincerely yours,

Norbert Wiener

hb

COPY

October 20, 1952

Mr. Henry Simon
Simon and Schuster, Inc.
630 Fifth Avenue
New York 20, New York

Dear Mr. Simon:

Professor Wiener has asked me to send you this photograph, and to tell you that it is his "best and favorite." Credit should be given to E. Goldberg.

Sincerely yours,

Mrs. George Baldwin
Secretary to Prof. Wiener

hb

October 20, 1952

Mr. Henry Simon
Simon and Schuster, Inc.
630 Fifth Avenue
New York 20, New York

Dear Mr. Simon:

Over the weekend, Margaret and I had luncheon with Drs. Felix and Helene Deutsch, the well-known psychiatrists. They are direct pupils of Freud, and are among the psychoanalysts of the classical Freudian school who have the greatest prestige not only here but in the world. They have been reading the manuscript of my autobiography very carefully, both as a literary document and as a psychoanalytical document. They still have a copy of my MS in their possession, and in a brief time we shall have another brief conference on it. They criticize rather severely the way I have treated classical psychoanalysis, and I may find it necessary to ease up a little on my phraseology. But I am not going to make any fundamental change in my point of view as classical Freudian psychoanalysis is for them almost a religion, and as my more modernly inclined psychoanalytical friends, such as Dr. Farnsworth, tend to agree with me in my point of view.

Apart from this and one or two minor criticisms, they are enthusiastic about the book, from a literary point of view and as an honest and authentic document in an almost undocumented field. After my next discussion with them I may give you a more detailed account of their opinion and criticisms. However, my experience with them as with other leading psychoanalysts and psychiatrists convinces me that if we go out after it we shall find a relatively large sale in psychoanalytic, psychiatric, and other related quarters. I am quite aware that numerically this sector of the public is not large enough to bulk large among the sales we hope to make and that our main market is the general public. Nevertheless, in view of the peculiar position of these specialists as mentors for a large part of the unprofessional public, I do not believe

Mr. Henry Simon -- 2

we should underrate the secondary effect of this market. I think that if we go out after it we should substantially increase our general market, and that it is just waiting for a little effort on our part. In other words, besides our general advertising campaign, I should address, if I were you, a particular campaign towards psychoanalysts and psychiatrists, and I should secure the help of anyone prominent in this field in getting out a ~~littar~~ one-page flier to go through the appropriate channels to reach them.

As to the possible second volume of my autobiography, while I realize that this is not immediate business and that it must wait, on the one hand until we see the reception of my first volume, and on the other hand until I have cleared off a large part of my present research program, I am thinking seriously of what I shall do with it when the time comes, and in particular of what I should say concerning the moral problems of the scientist in the present world and, in fact, his general problems of adjustment. I have already given a talk on this subject to an audience at the Graduate House at M.I.T. and I have met with a most favorable reception of my ideas. Some time when I come again to New York I shall want to go into more detail with you.

My galley's have not yet turned up. While I shall overhaul them thoroughly, I am enough of an old hand at the publishing game to realize that uncalled for corrections should not be made, and that even the corrections that I must make should be so carried out as to create the smallest possible problem in pagination and in paragraphing. I can promise you a quick return of the proofs after a thorough reading in which I shall be helped by my secretary and my wife.

As to the list of "musts" for sending my personal copies to (notice that I am not loath to terminate a sentence or clause with a preposition), my secretary and I will work over this list on receipt of the proofs. And when these are in your hands, I believe you will have nothing further to worry about.

My wife joins me in sending you our best regards. If you come to Boston on any business, do look me up for the fun of it.

Sincerely yours,

Norbert Wiener

hb

Mr. Henry Simon -- 3

P.S. Another sector of the market which is sure-fire is the University sector. If you feel that it is worthwhile to circulate at least Harvard and M.I.T. and Tufts when the book comes out, I believe that you will find it substantially increasing sales.