

RESEARCH

Government Relations

Six men are shown in an application to the Office of Ordnance Research for continuation of the present contract at an estimated cost of \$21,000 plus \$5,250 for 25 per cent overhead allowance. The same tabulation shows an application for a contract of the National Science Foundation for five men who with 15 per cent overhead and secretarial help totalled an estimated \$29,280. Also showed eight men on Institute stipends at \$32,400 with reservations made for ten more at \$30,000. Also there was an application to the Office of Scientific Research for continuation of present contracts for three men who with overhead, travel funds, etc. totalled ~~\$7~~ \$21,450.

D, Mathematics Budget

PRINCETON UNIVERSITY

Relations W.O.A.I.

Following IAS members listed as visiting professors of Princeton University:

Cherniss, Meritt, and Thompson.

Princeton Univ. Official Register

GEST ORIENTAL LIBRARY

Facilities

PRINCETON UNIVERSITY

Relations W.O.A.I.

Hu Shih honorary Curator of the Gest Oriental Library with rank of Professor.

Official Register of Prince. Univ. 1955-56

EINSTEIN, ALBERT

Biographical

1955 press clippings--two stories, both dated April 30, 1955, New York Times and Herald Tribune; both describe the will of Einstein who died April 18, 1955, as carrying bequests totaling \$65,000 to his housekeeper-secretary, Miss Dukas; and his step-daughter, Miss Margot Einstein; his son, Dr. Hans Albert Einstein, and his younger son, Eduard. There was doubt that the estate was large enough to cover the \$65,000 in bequests which were \$20,000, \$20,000, \$10,000 and \$15,000 respectively for the parties named above.

Household effects and furnishings left to Margot who owns the house at 112 Mercer. His violin was willed to his grandson, Ben Hart, son of Hans Albert. His books and personal effects were willed to Miss Dukas, and all of the literary property and rights, including copyrights and royalties to be held in trust for Miss Dukas and his step-daughter successively, and thereafter to go to Hebrew University in Israel. Dr. Otto Nathan of New York University was executor and with Miss Dukas, Trustee. Date lines for the stories are Princeton. He left his brain and other parts of his body to science for analysis.

D, Einstein, Albert - 1955 Press Clippings



MEMBERS

Academic Personnel

See undated memorandum resolving questions of conflict  
in tenure and mention in the bibliography.

D File, Bibliography - Preparation of

INSTITUTE

Publications

GENERAL

Public Relations

See this file for substantial number of requests for  
bulletins ~~for~~ prospectuses, catalogues, etc. on the Institute  
for Advanced Study.

D File, Bulletin Requests

EINSTEIN, A.

Biographical

See American Jewish Ledger 10/28/55. Commemoration  
article by Bertrand Russell and others - Biographical facts,  
etc.

Also Linus Pauling The Open Forum, Los Angeles, May, 1955.

Newspaper clippings all dates.

D, Einstein, Albert E.

PRINCETON UNIVERSITY

Relations WOAI

MOREY, C. R.

Biographical

In appreciation of Charles Rufus Morey, November 20, 1877  
to August 28, 1955.

. Page 7, an excerpt: (also end of page 6)

"The list of writings published over Morey's signature is impressive enough. It represents, however, only a fraction of his actual work. In many books and articles produced by American art historians during the last three or four decades the reader will find a note extending the author's thanks to Charles Rufus Morey for having suggested the subject, for having generously assisted in its treatment or, more often than not, for both. This is because Morey did not consider research and teaching as separate or even separable activities (one of the few things that could shake his equanimity was the ignorant and arrogant notion that academic teachers should not 'waste too much time' on research).

For forty years he taught while he studied, studied while he taught, and, like a good magister operis, cared little how much of his own thought, observation and skill went into the work of those who under his guidance developed from apprentices into masters."

manuscript

An excerpt from page 10 of the ~~MSS~~ copy:

"Classical, 'modern,' and East Asian art was vigorously ~~perks~~ pursued. The foremost concern, however, as reflected in the subjects of the departmental publications, continued to be Early Christian and mediaeval art.

"No doubt all this was due, in a large measure, to Charles Rufus Morey; but it can hardly be said that he planned or even wanted it this way. He was enthusiastically a mediaevalist but even more enthusiastically an art historian tout court, encouraging every serious effort regardless of his private preoccupations and going to battle wherever the future of the discipline was at stake.

He was loyal to Princeton University but no less loyal to the cause of humanism as such, giving wise counsel and active co-operation to other institutions not so much in spite ~~of~~ as because of the fact that they might 'compete' with his department either materially, as was the case with the Institute of Fine Arts of New York University, which he helped to develop in every possible way, or intellectually, as was the case with the Institute for Advanced Study in Princeton, whose School of Humanistic Studies, as it was then called, would not have come to live without his advice and unstinting support. But he could not prevent the force of his personality from acting upon his surroundings much as the force of gravity operates in the physical world."

The appreciation gives Morey's place in his field, and credits him not only with the great learning and inspiration in teaching Christian and Mediaeval art, but also with the foundation of the idea of the laboratory library, ~~xxxxxxx~~ on which he published a book in 1932 at his own expense. And further, he conceived and began to assemble in a shoe box in 1917 "that powerful ~~of~~ tool of iconographic--and not only iconographic--research, the Index of Christian Art, which now comprises more than

~~XXXXXXXXXX~~

five hundred thousand entries--most of them personally verified by Morey as long as he was in Princeton--and more than one hundred thousand photographs." He planned, organized, and secured aid for photographic campaigns in Greece and the Near East and excavations in sites as widely separated as Angers and Antioch-on-the-Orontes. He helped to found--and to support during many vicissitudes the Art Bulletin. At about the time he was to retire from his professorship, he accepted an appointment, the first of its kind, as Cultural Affairs Officer at the American Embassy in Rome. In this capacity he also acted as Director of the American Academy from 1945 to 1950. He may be said, "to have done more to heal the wounds inflicted by the war upon Western civilization than would have been possible for any professional diplomat." There are other enumerated contributions of Morey to his field and his times, which will prove useful.

MATHEMATICS

Academic Activities

SCHOOL OF MATHEMATICS

Academic Organization

of the 81 short-term members listed in the School of Mathematics for the first term  
53 ~~math~~ are mathematicians. The three assistants listed in this School are also  
mathematicians.

Interview with Professor Veblen, 11/18/55

✓1955  
FLEXNER, ANNE CRAWFORD

Biographical

Mrs. Flexner died at Butler?? Hospital, Providence, Rhode Island, January 11, 1955. Press notices describe her as 80, playwright, She had dramatized Mrs. Wiggs of the Cabbage Patch by Alice Hegan? *Wright* Wright??. She had written The Marriage Game, Aged 26, Miranda of the Balcony, A Lucky Star. She was born in Georgetown, Kentucky, and graduated from Vassar.

She had been active in founding the Dramatists' Guild of the Actors' League, and was a Board member for many years.

A, Flexner, Abraham

PARTICIPATION IN ADMINISTRATION

Academic Personnel

SCHOOL OF HISTORICAL STUDIES

Academic ~~Personnel~~ Organization

MEMBERS

Academic Personnel

SCHOOL OF MATHEMATICS

Academic Organization

Alföldi voted.

Woodward reported the choice of successor to Earle had narrowed down to Professor Samuel E. Thorne and David Harris Willson, with the School favoring Willson.

School of Mathematics got the Faculty to approve an extension of a three-year appointment for Professor Kunihiko.

~~Professor~~ Yang was approved for a Professorship.

The Director brought up Professorship for Placzek. Moved by Cherniss, seconded by Panofsky that Placzek be recommended to the Board of Trustees for Professorship. Defeated by majority of Faculty Minutes, 1/14/55



GIFTS

Foundations

MORGAN, MINOT C., JR.

Biographical

Morgan to Oppenheimer, January 19, 1955.

A discussion of raising funds divided into expendable funds and capital funds.

He describes five methods of raising expendable funds: annual giving, memorial insurance, foundation grants, grants from industry, and government contracts.

He gives it as his opinion that the Institute does very well, and occupies a very favorable position with the foundations. He feels, likewise, with respect to government agencies that contract for research as to annual giving and memorial insurance, he finds that "Our 1000 'alumni' represent a very small base, they are largely impecunious, and they all have prior loyalties to other educational institutions."

With respect to capital funds, he thinks that a proposal might well be ~~initiated~~ to the Board of Trustees that a presented

bequest program be instituted. ~~xxxx~~ Such capital funds come through special gifts or bequests. He finds that special gifts are frequently restricted as to use, and he thinks that the Institute is in a very good shape to accept restricted money compared to most institutions of higher learning. He suggests endowed professorships, endowed memberships, or even plant without the Institute's hands being tied in any way, but he favors ~~xxxx~~ bequests as a fairly painless method of fund-raising, and it might provide the opening wedge of interest on the part of the Board to engage in a capital gifts effort from other sources. "In fact, it might do for fund raising exactly what the Government Loan proposal has done for our housing project: To wit, put the Trustees in the position of being committed to some extent, in order that they may be later committed to more."

D File, Fund Raising

TAXATION (INCOME)

Government Relations

Oppenheimer's memorandum informs members that the 1954 Internal Revenue Act became effective last summer, and provides for the exclusion of a maximum of \$300 a month or \$3600 a year to any post-doctoral fellowship on the tax-payer's gross income. Also U. S. Tax Court handed down a ruling on the Stone case declaring a Guggenheim Foundation grant non-taxable.

D, Memoranda to Staff and Members

1955

2/3

APPOINTMENTS

Academic Personnel

BENEFITS

YANG, CHEN NING

Biographical

Oppenheimer to Yang, February 3, 1955.

Offers Yang professorship. May retire at any time after 65th birthday, and according to present rules must retire on the June 30th after 68th birthday. Initial salary \$14,000 a year. Making available to him \$1,000 a year to cover travel expenses for professional purposes, this fund cumulative up to total of \$3,000. Both I. A. S. and Yang to contribute 5 per cent to TIAA. Entitled to have professional research assistant if he should desire one, or to contribute the fund so budgeted as a grant for a member in whose work ~~you~~ he is interested.

D, Yang, Ehen Ning

PARTICIPATION IN ADMINISTRATION

Academic Personnel

NOMINATIONS

WOODWARD, SIR LLEWELLYN

Biographical

E. Llewellyn Woodward to The Director, February 3, 1955.

"The Director

"You may care to read this--especially the last paragraph. I am not circulating it because it is just a private letter to me. Anyhow--especially after Davis' letter--so very typical of a man of great industry and no talent or spark in him. I'm sure we aren't going to persuade E. K. ! And though we have no ~~librarian~~ veto we don't want another debate about consensus.

"But the problem will remain. Counting Alfoldi--who is classical [?] alright in himself--four out of the seven of us in the School ~~are~~ non-American by birth and training, and only one of us has any professional interest in the vicissitudes of Political Man since about 1600 a. d.

"I am sure from the point of view of the Institute that this "didn't ought to be," and I know that it is a count ~~for~~ which some outside critics have against us--(I wouldn't mind this if I didn't think such criticism well founded)."

"E. L. W."

"Feb. 3, 1955"

1955  
TRUSTEES

Corporation

FACULTY

Academic Personnel

SALARIES

PARTICIPATION IN ADMINISTRATION

VEBIEN, O.

Biographical

OPPENHEIMER, R.

Note: There were no faculty meetings from March, 1955 to November, 1955. There was an increase in salary for all Institute professors to \$18,000 resulting from action by the Trustees on October 27, 1955. There is no allusion in the minutes to the faculty moving for this increase in salary.

Note: Veblen said at the Trustees' meeting of April 5, 1955 that at the time of the founding of the Institute the \$15,000 maximum faculty salary made it possible to attract

professors from any other institution, but that the increase of twenty percent reflected in today's salaries was not as large as the increase in full professors' salaries, generally. Dr. Oppenheimer stated that to his knowledge there had been only two formal declinations of appointment to the Faculty and that one of these was clearly not for financial reasons.

GIFTS

Finance

SCHWARTZ, MARVIN L. (Counselor-at-law)

Biographical

Marvin L. Schwartz, ~~AKA~~ Counselor-at-law of New York to the Institute, March 4, 1955.

He has a client wishing to ~~have~~ draw a will in which the IAS is to be named one of the remaindermen of a trust.

Oppenheimer responds March 7, 1955

There is no further information in the file.

D File, Donations

3/8  
3/22  
11/8

PARTICIPATION IN ADMINISTRATION

Academic Personnel

KENNAN, GEORGE

Biographical

See these Minutes for reference to above.

Faculty Minutes of above dates.

HONORS

Academic Personnel

PANOFSKY, ERWIN

Biographical

AYDELOTTE, F.

Panofsky to Aydelotte, March 9, 1955.

He declines the great honor offered him in Aydelotte's letter of March 5; namely, the Eastman professorship at Oxford University (one year). He gives two reasons, "each of which would have been prohibitive."

(1) He still owes a manuscript to the University of  $\S$  Uppsala which has been very kind in time to him, and he must deliver the typed manuscript by October 1 this year.

(2) He is expecting "what I consider my two most distinguished English colleagues at the Institute for the first term of the academic year 1955-56: Martin Davies, Deputy Keeper of the National Gallery, and Francis Wormald, formerly of the British Museum and now Professor of Palaeography at the University of London." They have had difficulty securing leave of absence, and Panofsky feels that he can not be away since they have made the effort to be with him.

D File, Panofsky, Erwin, 1945



MEMBERS

ARCHEOLOGY

GOLDMAN, HETTY

BAILEY, HERBERT S., JR.

Publications

Academic Activities

Biographical

Herbert S. Bailey, Jr. of the Princeton University Press to Oppenheimer to publish Volume II of Tarsus, 400 copies, \$14,000 ~~for~~ from Institute for Advanced Study, cost of manufacturing. Sell volume at \$36 and Press keeps proceeds from sale of first 150 copies.

D File, Goldman, Hetty, 1948

**TAXATION**

**Government Relations**

Memoranda to the Members of the Institute from Oppenheimer regarding taxation.

Filed in Vertical File under "T" for Taxation.

D File, Income Tax - Taxability of Grants, 1950

1955

April and May

BUILDINGS AND GROUNDS

Facilities

See letters of Oswald Veblen (April 29, 1955) and Aydelotte (May 6, 1955) objecting to the location of the housing project, the plot plan??, and the design. Also Aydelotte objects to destroying useable homes at present in the project.

A. File, Institute for Advanced Study

✓1955

4/5

GENERAL

Corporation

25th anniversary commemorated at dinner at Fuld Hall, April 5, 1955.

A. File, Institute for Advanced Study

GIFTS

Finance

LANGERMAN, SAMUEL, (Attorney at Law)

Biographical

Samuel Langerman, Attorney at Law, Phoenix, Arizona,  
to the Institute, April 7, 1955.

A client wishes to leave his capital after the income goes to living beneficiaries through a trust to an institution having to do with the education of outstanding young persons in scientific fields of endeavor. He is not interested in financing research by persons who have already completed their education and training. Oppenheimer responds April 12, and emphasizes that a third of the members of the Institute are immediate post-doctoral students who are in advanced and intensive phase of their professional training, and that, therefore, it would seem that the conditions of a grant of this kind would be compatible with his client's desires.

There is no further correspondence on the subject.

D File, Donations

4/10  
4/12

BAILEY, MRS. ESTHER S.

Biographical

FLEXNER, A.

OPPENHEIMER, R.

Mrs. Bailey to Oppenheimer, April 10, 1955.

Without Flexner's knowledge, she says she acknowledges receipt of the bibliography, and criticizes the introductory statement for not mentioning Flexner. She says that in many conversations with the founders, they expressed their deep debt to Flexner, and that she thinks it would have been appropriate for the introductory statement of the bibliography also to mention his name.

She adds a postscript, "I should also add that in consequence of the attitude at the present time toward the author, creator, and the first director of the Institute I have changed my will, making my own Alma Mater instead of the Institute for Advanced Study beneficiary, not a large legacy but all that I have saved, amounting by 1955 to over \$100,000."

Mrs.  
Oppenheimer to/Bailey, April 12, 1955.

A formal statement that the reasons why he did not mention Dr. Flexner were, "are perhaps more obvious to me than to you." We decided not to make this foreward in any way a history of the Institute, but just a brief introduction to the following bibliography and directory. At the same time, we decided that we would try to have a history written by a competent scholar, who could record thoroughly the history, and who could do justice to the men and women who created and shaped the place... It would have been easy for me to refer to him in the foreword, and I regret that I did not. With every good wish,"

D File, Bailey, Esther S. (Mrs.)

4/11  
4/15

GIFTS

Finance

GENERAL

Public~~at~~ Relations

As a result of Oppenheimer's broadcast with Ed Murrow, Victor M. Carter of Van Nuys, California, wrote, saying that he was anxious to do something toward making scholarships available in the manner discussed by Oppenheimer in the broadcast. This letter was dated April 11, 1955.

Oppenheimer was away, and the correspondence was really overlooked until April, 15, 1955, when Oppenheimer returned and established a cordial relationship with Victor M. Carter, as a result of which, on June 13, 1955, (Carter to Oppenheimer) Carter sent a check for \$6,000 to ~~xxxxxxx~~ constitute the stipend for Dr. Wolfgang Köhler of Swarthmore in studies in brain physiology, and in part on amplifying and building up the Hitchcock lectures just given at the University of California.

Carter expressed a desire to finance an annual grant-in-aid of \$3,000, but when the first one came along, and amounted to \$6,000, he happily contributed.

D File, Carter Fellowships

EINSTEIN, ALBERT

Biographical

Excerpt from an address by Harlow Shapley, April 13, 1955.

"I remember the time when Albert Einstein addressed the Academy. He was introduced in German, or near German, by President George Foot Moore. The theory of relativity--its equations--amazed us of course, but Mr. Einstein was amazed, or at least he looked amazed, when his equations would disappear from the blackboard immediately his back was turned. For Professor Julian Coolidge, in a helpful mood, would jump up and erase an equation when it had been once used. Here we believe, apparently, in fresh equations."

Daedalus, the Proceedings of the American Academy of Arts and Sciences, Volume 86, No. 2, September, 1956, p. 110



4/5  
4/25

1956

For first time since 1947 SDL consented to  
re-election of Tr whose terms expired - Lewis, Rosenwald  
& Shuman. (Assume correct conclusion age Shuman  
turning chair on to SDL or was it so Shuman could  
(SDL no longer a Nom. com.)  
nominate?) See action 1951 when 3 classes -  
1949-51, were re-elected. Thereafter Shuman adopted  
parliamentary tactics to compensate for failure  
of the Nom. Com. which he had <sup>appointed on Nom. com. basis</sup> ~~been~~ <sup>accepted</sup> in 1954 (1951)

to function:

4/25/56 Shuman <sup>absent</sup> - SDL presided - Nom. com. Reported  
that with terms expiring were re-nom'd & re-elected. This allowed

Spectral (a mtg. 11/15/55 when Shivers was absent, -  
D + mutual <sup>alone</sup> opposed Kennan's app. as Pf. after  
national procedure upheld (i.e. no minority of  
fac to present case vs. Fo Bd, despite visit  
of Montg & Selberg to Mess which Hochsch'd indirectly  
said was inappropriate). Ad regarded that Morse  
& Whitney of math. held that SAs should  
have the respect of SAs in its nomination.  
(and Dyson, Pais & Yang with Morse & Whitney)

Members

SHS

SM

Ro.

Sites. having to turn down <sup>appt. for</sup> members

who are doing very important work of study  
of important fields

At same time Yang raised from 14m to 18m

" " " alföldi aptd.

Reserve for post modern history. (via Galt. Requirement  
most ~~likely~~ acquaintance  
w/ program.)

1.1 mi.

WEYL, HERMANN

Biographical

EINSTEIN, A.

It is Weyl's appreciation of Einstein at the time of his death, and shows an address to Tom Costigan, CBS-TV. (Check to see whether Weyl delivered this).

"With Albert Einstein one of the greatest scientists of all time passed away. His special theory of relativity deeply modified our views of space and time, in a manner that not only affected our philosophical concept of the universe but also the most concrete theories of physics as for instance the theory of atomic spectra. Everybody knows of what significance his relativistic formula connecting mass and energy has been for the development of nuclear physics. Combination of a sober sense for reality with a speculative approach to principles and ideas is typical for Einstein's scientific genius. He was singularly free from prejudices, in science as well as human affairs; simple and direct were his thoughts, simple and kind was his soul.

"While other scientists were busy to swallow his new

insight into the relative nature of simultaneity he himself passed on from special to general relativity, according to which gravitation is most intimately associated with the geometric properties of the universe. But also in quantum theory, especially the quantum theory of he did some of the spade work, which showed Planck's energy quanta had a higher claim to reality than the physicists had first thought. In later years he was occupied with developing a unified field theory covering both the gravitational area & the electromagnetic forces in nature. He made quite a number of attempts in this direction. After he had conceived a new idea it took him years to work out its mathematical consequences to the point where it was possible to compare the theory with experience, and had he been anxious at the beginning to show you the merits of the new idea, he was no less anxious to tell you at the end that and why the idea had failed. If anybody had earned the right to work out a fundamental problem and ignore the more detailed and day by day problems of physics, it was Einstein. We do not yet know whether his last attempt failed or succeeded; no doubt in time this question will be decided. At the moment physical science seems to be confronted with more immediate tasks.

I have known Einstein since 1913 when we both taught at the Institute of Technology in Zürich, Switzerland. I had the closest contact with him immediately after the First World War when I myself worked in relativity theory and made the first attempt of a unified field theory. He was not satisfied with it and his objections ultimately proved right. But this controversy with him is one of the nicest experiences of my life; he was both kindness and frankness in one.

In 1949 he wrote an autobiography for ~~XXXXXX~~ Vol. VII of the Library of Living Philosophers edited by Paul Arthur Schilpp, which I recommend to all who want to get some first-hand information about the man Einstein. The first sentence of it reads as follows: 'Here I sit in order to write, at the age of 67, something like my own obituary.' Later on, after explaining one of the ideas that had moved him in his scientific life he says: 'Is this supposed to be an obituary?' The astonished reader will likely ask. I would like to reply: essentially, yes. For the essential in the being of 'man of my type lies precisely

~~XXXXXXXX~~

in what he thinks and how he thinks, not in what he does or suffers.' In conclusion let me quote a more from ~~this~~ autobiography which contains his scientific credo as in a nutshell: 'It is an error to assume that facts by themselves can and should yield scientific knowledge without free conceptual construction.'"

GENERAL (PURPOSES)

Corporation

In writeup of Institute for ~~The~~ World Book Encyclopedia of Field Enterprises, Inc. submitted by Mrs. Russell, it is stated catagorically: ~~"The Institute"~~ "An Institute for post-doctoral research, providing facilities for advanced study and independent research, within the scope of the activities of the Institute, to a limited number of scholars in the fields of mathematics, mathematical physics, and historical studies..." 30 permanent members of which 15 constitute the faculty, and approximately 100 temporary members in residence each year appointed for one or two year term. The library contains some 40,000 volumes. "The Institute is not officially connected with Princeton University; but publishes jointly with it the Annals Of Mathematics, Annals of Mathematics Studies, and Princeton Mathematical Series."

D, Institute, Listing of

HOUSING

Facilities

VEBLEN, O.

Biographical

AYDELOTTE, F.

Veblen (4/29) Aydelotte (5/6) to Morgan in regard to new housing project. Both deplore destruction of Minesville housing and obliteration of Cook Road. Both deplore quadrangular plan on grounds of view from family dwellings and attendant regimentation in common living and play/space; both dislike the architectural plan. Aydelotte believes it should be more in style of Fuld Hall. Veblen holds the modern house plan, in reality a return to 2 or 3 thousand years B. C., Abandoned for more aesthetic plans when it was possible within 20 years. It will be as ugly as Mid-Victorian is to us today.

A File, E. A. Lowe

EINSTEIN, ALBERT

Biographical

Will of Albert Einstein with notation at top "not to be released before Saturday, April 30, 1955, 2 p. m."

Also statements from the Institute faculty and Dr. Oppenheimer

All filed in Vertical File under "E" for Einstein.

D Files on Einstein



FOUNDERS

Corporation

MAASS, H.

Biographical

EINSTEIN, A.

"I deleted two paragraphs before this copy was written, and when I delivered the speech I deleted the marked portion on page 3."

Maass Interview 11/17/55

See Vertical File \* MAASS, H.

EINSTEIN, ALBERT

Biographical

Article by Albert Einstein in "Friends Intelligencer,"  
A Quaker Quarterly, No. 19, Vol. 112 entitled, "On My Participation  
in the Atomic Bomb Project."

Filed in ~~Chronological File~~ Biographical File under  
Einstein.

Source Above.

GENERAL

(American Institute of Geonomy and  
Natural Resources, Inc.)

Relations W.O.A.I.

Correspondence about AIGNR holding International Conference at IAS

File D Amer. Inst. of Geonomy and Natural Resources, Inc.

*Inst Gen  
Amer Inst*

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

OFFICE OF THE DIRECTOR

29 June 1955

Dear Dr. Field:

This is to acknowledge and thank you for your letter of June 27th and the enclosed copy of your letter to Mr. Morgan. We shall hold these for Dr. Oppenheimer's attention on his return to Princeton at the end of August.

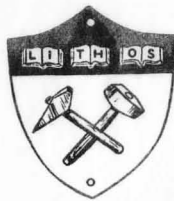
Sincerely yours,

(Mrs. Wilder Hobson)  
Secretary to the Director

Dr. Richard M. Field  
President-Director  
American Institute of Geonomy  
and Natural Resources, Inc.  
South Duxbury, Massachusetts



1926  
P.S.S.G.N.R.



1951  
A.I.G.N.R.



AMERICAN INSTITUTE OF GEONOMY AND NATURAL RESOURCES, INC.

SOUTH DUXBURY, MASSACHUSETTS U.S.A.

RICHARD M. FIELD, DIRECTOR  
ARTHUR H. MURPHY,  
ASST. DIRECTOR AND TREASURER

INTERNATIONAL ADVISERS  
FRANS VERDOORN AND JOHN A. FLEMING

FANNY S. FIELD, SECRETARY  
WINSOR B. LEACH, EDITOR  
TELEPHONE, DUXBURY 266  
CABLE, GEONOMY

June 27, 1955

Dr. Robert Oppenheimer, Director  
The Institute for Advanced Study  
Princeton, New Jersey

Dear Dr. Oppenheimer:

I enclose a copy of my letter of June 27th in reply to Mr. Morgan's unexpected letter of June 23, 1955.

The contents of Mr. Morgan's letter was reported to the A.I.G.N.R. Board of Directors at a special meeting, June 24.

We deeply regret that you and the Institute will be unable to serve as host to the International Conference on Science and Human Welfare because we feel that no other place in the United States would be so satisfactory.

Sincerely and gratefully yours,

Richard M. Field, President-Director  
A. I. G. N. R.

enclosure

copies to: Mr. Minot C. Morgan  
Dr. Vannevar Bush  
Dr. Arthur H. Murphy  
Dr. Harold W. Dodds



1926  
P.S.S.G.N.R.



1951  
A.I.G.N.R.



AMERICAN INSTITUTE OF GEONOMY AND NATURAL RESOURCES, INC.

SOUTH DUXBURY, MASSACHUSETTS U.S.A.

RICHARD M. FIELD, DIRECTOR  
ARTHUR H. MURPHY,  
ASST. DIRECTOR AND TREASURER

INTERNATIONAL ADVISERS  
FRANS VERDOORN AND JOHN A. FLEMING

FANNY S. FIELD, SECRETARY  
WINSOR B. LEACH, EDITOR  
TELEPHONE, DUXBURY 266  
CABLE, GEONOMY

June 27, 1955

Mr. Minot C. Morgan, Jr. General Manager  
The Institute for Advanced Study  
Princeton, New Jersey

Dear Mr. Morgan:

We regret that your important information of June 23 is so delayed, and that you now tell us on behalf of Dr Oppenheimer, that you were "perhaps (some-what) remiss in not having kept him (Oppenheimer) abreast of local developments".

However, my own experience with Princeton authorities leads me to sympathize with you in your managerial problems.

Although there are several reasons why the A.I.G.N.R. and its correspondents would have preferred to have the International Conference on Science and Human Welfare (I.C.S.H.W.) held at The Institute for Advanced Study (I.A.S.) we can still arrange to have the Conference elsewhere, if not so near New York City, for the convenience of the delegates.

The countries and nations already concerned will be notified that only because of unforeseen material difficulties the I.A.S. regrets that it will not be able to serve as host for the I.C.S.W. in spite of the fact that it had already graciously consented to do so.

Cordially yours,

Richard M. Field, President-Director  
A. I. G. N. R.

enclosure  
copies to: Dr. Robert Oppenheimer ✓  
Dr. Vannevar Bush  
Dr. Arthur H. Murphy  
Dr. Harold W. Dodds

1955  
LOWE, E.A.

Biographical

Curriculum vitae

*Filed Vert. file under "L" for Lowe.*

Vertical File

HISTORY (PLACE OF INDIVIDUAL)

Academic Activities

Address by Caryl P. Haskins, (Phi Beta Kappa oration, Harvard University, June 13, 1955, "Science and the Whole Man.")

"...each must be aware that, however massive in numbers, however complex and tightly knit in organizational terms, each profession may become, it is only through the media of great judgments, great imaginations, great personalities given or developed by individuals (his) that wisdom and true innovation can be coined and effectively imparted to the nation...the highest public contributions can ~~be~~ only be made by men who are not only impeccably trained in their own fields but who can weigh and balance component against component, value against value, in an intensely complex and shifting scene, and can communicate the result of that weighing effectively to those who must make the final decisions.

"The greatest and the truest and the most compelling reason lies in the very nature of science and scientific research itself. For the whole stature--the very life--of our

culture and our very appreciation of the world and our harmony with it rest with Him and his fellow creators in the arts and literature and philosophy and religion. It is the gifted unorthodox individual in the laboratory or the study or the walk by the river at twilight who has always brought to us, and must continue to bring to us, all the basic resources by which we live. Let us guard and honor his position and his profession with every resource that we can muster. Amid the turmoil of the super highways and the organization and the standardization and the mass approaches with which we must live now and in the future, we must seek more than ever to find and nourish and appropriately train, and to protect and cherish, that irreplaceable element of our society, the individual unorthodox explorer."

Daedalus, The Proceedings of the American Academy of Arts and Sciences, Volume 86, No. 2, September, 1956, pp. 120-121



FOUNDERS

Corporation

GIFTS

Finance

Of the funds* IAS from founders	\$21,081,580.62
Net profits in sales of securities and real estate were	<u>4,406,097.12</u>
Sec. for cash from L. B. & C. F.**	16,675,483.50
Maass said 12/11/52 L. B. & C. F. had given till then	<u>16,462,365.</u>
Given 1952-5 (bequeathed)	213,118
1955 Sivian estate carried on balance sheet at \$210,153 in addition	

\* Called general funds on Balance Sheet

\*\* Some from L. B. C. F. trust funds E. S. Bamberger (d. 1952)

Treasurer's Report, Exhibit B

✓ 1955

6/30

SCHOOL OF MATHEMATICS

Academic Organization

ELECTRONIC COMPUTER PROJECT

Academic Activities

Balance Sheet shows I. A. S. had spent \$65,271 on E. C. P. and others had and would contribute \$1,423,068.22, making total on liability side \$1,488,339.

On asset side, Cost of 2 computers built: (Proj. #1 & #2)	\$ 797,641
Cost of buildings	<u>184,471</u>
	982,112
Proj. #3 continuing research	<u>506,227</u>
Total	1,488,339

Project #3 Institute has contracted for further research and development work on electronic computing devices.

~~XXXXXXXXXXXX~~ Treasurer's Report, Exhibit A

PARTICIPATION IN ADMINISTRATION

Academic Personnel

WILLOUGHBY

Biographical

WOODWARD, SIR LLEWELLYN

E. Llewellyn Woodward to The Director, July 1, 1955.

"The Director.

"The enclosed letter explains itself. I might add that I have talked often to Willoughby about his work. He has made the discovery which most of us make at some time in our lives that when we set out to write one volume we have to write two. I thought that in talking to Mr. W. made out a convincing case for dividing his work into two volumes. The subject is an interesting one. And he is approaching it in the right way. That is to say he is writing not merely a chronological history but an analysis of the future involved in an important international economic and political problem. He is a tremendous worker, and now has his tooth sharpened and his material all collected. I think it would be a pity having helped him so far not to help him to finish the job.

I don't blame him for not realizing [?] before [?] that it was a bigger job than he had reckoned on. Having made, as I say, this same mistake more than once, I am much more inclined to regard it as a sign of merit--or perhaps I should say, of grace! that a man sees himself compelled by the logic of his material to enlarge his plans for dealing with it.

"I have told W. that of course I didn't know whether our funds would run to another year, and that we shouldn't be able to tell him until March."

"E. L. W."

"7.1.55"

D File, Historical Studies Panel on the New Faculty

BAMBERGER, LAVINIA

Biographical

Died

~~File~~ D Bamberger, C. L.

8/23  
8/25

SCHOOL OF MATHEMATICS

Academic Organization

MEMBERS

Publication

MORSE, MARSTON

Biographical

OPPENHEIMER, R.

Morse to Oppenheimer, August 23, 1955.

He encloses a copy of a letter from himself to Oppenheimer dated April 5, 1955, in which it was arranged that pages additional to the three allowed a mathematician in the PROCEEDINGS OF THE NATIONAL ACADEMY could be paid for in the following manner: if the man was on contract the cost of the page was to be assessed against the contract. If he was a member of the Institute it was charged to the Publication Fund.

On August 23, Morse raises the point much could be done about the same contingency for members whose grants come from outside the Institute, and not from a contract. What should be done about assistance paid from the assistance fund of the Institute? He recommended that the former case members seek aid outside from the source of his

funds, and in the latter the Publication Fund of the Institute should pay.

Oppenheimer to Morse, August 25, 1955.

He agrees basically and says that all the expenses to the Publication funds are to be budgeted to them and not to the stipend or assistantship funds. "With regard to members who are not paid by the Institute, and who are not on a contract, we may not be able to adopt a uniform policy. Fellowships, like the Jewett Fellowship, of the ~~past~~ past, which provide some payment to the Institute for the fellows' expenses, clearly oblige us to meet publication costs from these funds. I do not know what the view of the National Science Foundation or the National Research Council would be about grants for publications to fellows. I do not believe that they are likely to make such grants. I would, therefore, propose a uniform general policy that, for all members and assistants where we agree with the wisdom of publication in the PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, we pay the cost of an extra page from publication funds; and in the case of members who are here on contract, and where the contract so permits, we charge this cost of publication to the contract. He suggests the matter be taken up for approval with the other members of the school.

D File, Morse, Marston

8/30  
9/1

GENERAL (DEPARTMENT H. E. W.)

Government Relations

GENERAL

Corporation

Ernest V. Hollis, Chief of College Administration, Department H. E. W., to Oppenheimer, proposing to drop listing of the Institute in H. E. W.'s higher education directory because its program is post-doctoral and research in character rather than instructional in the sense of offering courses for credit or degrees.

Oppenheimer to Hollis, September 1. Disagrees and for following reasons asks continuation of listing: (1) I. A. S. chartered as an educational institution, (2) Explicitly so designated by legislation in New Jersey, (3) I. A. S. regards itself as an educational institution, (4) Counsel informs us that legislation exempting grants for fellowships is applicable to our members in part on the basis of the educational element involved in their membership, (5) I. A. S. designated in 1946 by the Attorney General as one of the educational institutions which was approved for the attendance of non-quota immigrant students, (6) As an institution of higher education I. A. S.

designated in 1950 as a sponsor of the exchange-visitor program by the Department of State.

Furthermore, designations have assisted members in obtaining visas, Fulbright and Smith-Mundt grants to defray their expenses.

D, Institute, Listing of

1955

BAILEY, ESTHER

Biography

Flexner's secretary who still goes to him in New York twice a week. Returned ROppenheimer's  
Forward to the Bibliography as unsatisfactory because it does not use Flexner's name.  
Lives at Peacock Inn.

v. 4

GENERAL (Oregon State)

Relations with O.A.I.

Wrote Robert Oppenheimer asking for advise on founding an Institute for Advanced Studies in Oregon. He received it about 2 days ago -- "They simply can't."

Interview R. Oppenheimer - 10/14/55



POLICIES

Administration

MEMBERS

Academic Personnel

Professor Kantorowicz reminded the School of its rule not to vote membership to applicants who have not an assured position to which to return after the expiration of their membership in the Institute. Professor Panofsky stressed the importance of not deviating from this rule, and the Director said that the desirability of maintaining it was generally recognized.

\* Frankel

Faculty Minutes, School of Historical Studies, 10/11/55

LIBRARY

Facilities

SACHS, JUDITH

Biographical

Miss Sachs told me that the Institute was buying rare books very judiciously and slowly. She did not indicate what had been paid for rare books up to the present time, or what their present value was, or the number of volumes. Look into this matter.

Information from Miss Sachs

1955

10/18

GENERAL (Institute for Basic  
Research in Science, University  
of California)

Educational Institutions

Clipping from the San Francisco Chronicle, October 18, 1955.

At a symposium on the physical sciences honoring Sproul on his 25th anniversary as University President, Chancellor Clark Kerr revealed the Foundation of the Institute with a fund of almost \$2,750,000 and an estimated annual budget of \$100,000 a year, and later, \$200,000, gift of a single donor anonymous.

The donor provided that the Institute "shall be dedicated to the encouragement of creative thought and the conduct of research and investigation in pure science."

In addition he specified: "...the primary purpose of the Institute shall be to discover and encourage the work of individuals of great talent and promise." Applied research projects may also be supported, but only if they offer a promising approach to fundamental problems. Will concentrate first on a ~~substantial~~ modest number of ~~substantial~~ projects, possibly 10. Date of operation not revealed. The University's Regents must appoint a

seven-member advisory board which will ~~also~~ consist of Sproul, ex-officio, three professors of the University, and three members not connected with the University. Each will serve a three-year term. The Executive Committee will consist of Sproul and the Board's three University members. They will execute the Institute's program, appoint research fellows, and allocate contingent funds to meet unexpected emergencies.

Aside from maintenance costs, the Institute's funds will be used to establish research professorships and scholarships, equip buildings and defray costs of operation. All researchers--professors and fellows--will be appointed for a maximum of five years which can be extended only by special vote of the advisory board. Preliminary plans were drawn up by a committee of 12 distinguished University scholars and scientists headed by Chancellor Kerr.

D, Publicity - Press Clippings

GENERAL  
FOREIGN  
SITE (Buildings & Grounds)  
FOUNDERS  
WEST ORIENTAL LIBRARY  
PRINCETON UNIVERSITY  
GENERAL  
REPORTS  
FLENNER, A.  
STEIN  
MAASS, HERBERT  
VENLEN, OSWALD  
OPPENHEIMER, ROBERT  
GOTTMANN, JEAN  
LEIDENDORF, SAMUEL D.  
ELLIOT, T. S.  
TOYNGER, ARNOLD  
LEVY, DAVID M.  
BIRNHOFF, D.  
NICKELSER  
WEYL, HERMAN

Academic Personnel  
  
Facilities  
Corporation  
Facilities  
Relations W O A I  
Academic Organization  
Corporation  
Biographical

(See FLENNER, A., Biographical - Interview of 10/31/55)

November

KENNAN, GEORGE D.

Biographical

MONTGOMERY, DEAN

FULTON, JOHN F.

LEWIS, WILMARTH

Dean Montgomery wrote to Fulton and to Wilmarth Lewis,  
or rather asked Fulton to pass the letter over to Wilmarth  
Lewis against Kennan's appointment.

One of Fulton files

ARCHEOLOGY

Academic Activities

ARCHEOLOGICAL INSTITUTE OF AMERICA (Prince. Society) Relations W.O.A.I.

The Society accedes to 2 conditions laid down by RO for use of Common Room:  
notification to him of dates of lectures and meetings, and freedom of members of IAS  
to attend meetings.

File D Arch. Inst. of America

1955  
WEYL, HERMANN

Biographical

See file for message sent by Oppenheimer from  
Faculty on Weyl's 70th birthday.

D File, Weyl, Hermann, 1946-

11/7  
11/8

SALARIES

Academic Personnel

GENERAL

Academic Organization

PRINCETON UNIVERSITY

Relations WOAI

SCHOOL OF MATHEMATICS

Academic Organization

FLEXNER, A.

Biographical

BIRTCHOFF, GEORGE D.

BAMBERGER, LEWIS

EINSTEIN, A.

WEYL, HERMANN

Interviews with Prof. Oswald Veblen, 11/7/55, and 11/8/55.

Filed in Vertical File under Interviews.

Interviews with Prof. Veblen 11/7/55, and 11/8/55



MATHEMATICS

Academic Personnel

THEORETICAL PHYSICS

Pauli to Oppenheimer, November 12, 1955.

"Now a few words on the situation in physics. In spite of great efforts from different sides, particularly by Landau and his collaborators, the structure of renormalized quantum-electrodynamics has not yet been clarified in a satisfactory way, as all mathematical methods proposed until now for a solution of this problem are using additional unproved hypotheses, which seem to me doubtful. At present it seems to me unlikely that this problem will be solved in the near future. My own interest is therefore withdrawing from this ugly mathematics and I feel as reaction to it a desire to come again in closer touch with nature, particularly with the new impirical material on mesons."

D, Pauli

GOLDMAN, HETTY

Biographical

FLEXNER, A.

VEBLEN, O.

MOREY, C. R.

SALARIES

Academic Personnel

PARTICIPATION IN ADMINISTRATION

Academic Procedures

SCHOOL OF HUMANISTIC STUDIES

Academic Organization

Interview with Professor Hetty Goldman

See Vertical File - INTERVIEWS

GENERAL (Amer. Math. Soc.)

Foundations

SCHOOL OF MATHEMATICS

Academic Organization

Curtiss, J. H., Exec. Dir., Amer. Math. Soc. to Prof. Morse:

"...For the next three-year period, 1956-1958, inclusive, the minimum annual dues of the Institute will be \$1,875..."

Prof. Morse to Dr. Curtiss:

"There is agreement among the mathematicians that it would be appropriate for the Institute to continue the payment of dues of \$2,050 even though our dues, strictly computed, are somewhat less than that."

File D Amer. ~~Math.~~ Soc.

11/16

1955  
GOLDMAN, HETTY

Biographical

EINSTEIN, A.

OPPENHEIMER, R.

Interview with Professor Hetty Goldman 11/16/55

GOLDMAN, HETTY - Biographical Filed Interviews.

SCHOOL OF ECONOMICS & POLITICS

Academic Organization

TRUSTEES

Corporation

FOUNDERS

MAASS, H.

Biographical

LEIDESDORF, S.

FLEXNER, A.

AYDELOTTE, F.

RIEFLER, W.

FRANKFURTER, F.

Interview with Messrs. Maass and Leidesdorf 11/17/55

EINSTEIN, A.

See Vertical File INTERVIEWS

✓1955

11/18

EINSTEIN, ALBERT

Biographical

Died at 1 a. m. (4/18/55, Monday) after stay in hospital from previous Thursday. No information released for first eight hours. Then hospital did.

~~GR~~ Gryzbeks

1955  
OPPENHEIMER, ROBERT

Biographical

MITCHELL

LEWIS, WILMARTH

FULTON, JOHN

Lewis to Fulton.

Everyone but Mitchell voted for Kennan's appointment.  
Veblen couldn't vote, but said he would vote no if he could.

Fulton to Lewis.

Veblen did much harm in attempting to represent the  
~~faculty~~ views of the faculty of the Kennan appointment.

Fulton's Diary

11/27  
12/6

WEYL, HERMANN

Biographical

Weyl's last letters to I. A. S.

Filed in Chronological File under 1955, 11/27.

D File, Weyl, Hermann, 1946



C O P Y

C O P Y

Bergstrasse 27  
Zürich

November 27, 1955

Professor Robert Oppenheimer  
Director, Institute for Advanced Study  
Princeton, New Jersey  
U. S. A.

Dear Robert:

Many were the messages I received on the occasion of my seventieth birthday, but none gave me deeper satisfaction than the poem in my praise which you cabled me in the name of the whole faculty of the Institute. My sincere thanks to you and every faculty member! How could I help to feel proud when I read it, but also: how could I help blushing! For I am only too aware of how short of the goal I had aimed at my arrows fell. But this, I think, is true: the will was good - though the flesh was weak.

Perhaps the Zurich years before 1930 were the most fruitful of my life scientifically, but the years at the Institute were the happiest. When Hella and I came over to America in the critical year 1933, a new light shone upon us; open doors and friendship we found everywhere, and at the Institute such a light-winged human and scientific atmosphere as we had never breathed before. We felt at home in Princeton almost from the very first day. And to participate in the Institute's early development was certainly a unique experience.

To the last breath of my life I shall be grateful for what the Institute has given me: a free and untrammelled opportunity for working in solitude and for communicating under ideal conditions with the many scientists who passed through our gates as temporary members; above this: the enjoyment of the friendship of my colleagues and of our always perfectly harmonious collaboration.

I hope, these ties will never break!

With the sincerest thanks and best wishes to all of you

yours forever

/s/ Hermann Weyl

Hermann Weyl

**COPI**

Bergstrasse 27  
Zurich

December 6, 1955

Professor Robert Oppenheimer  
Director, Institute for Advanced Study,  
Princeton, N. J.  
U. S. A.

Dear Robert:

My letter of Nov. 27 was incomplete: I forgot to mention the most important item: the "Selecta Hermann Weyl", a provisional copy of which was handed over to me by Prof. Eckmann at a banquet given to me by the Department of Mathematics and Physics of the Eidgenössische Technische Hochschule on the eve of my seventieth birthday. The publishers Birkhäuser in Basle did a fine job: it is an impressively looking volume. I got wind of the enterprise first from you, but was soon asked by the Zurich people for cooperation concerning a few details; in particular they discussed the selection of papers with me.

Apart from the few years in Göttingen, first as Privatdozent and then as Hilbert's successor, my whole scientific life was divided between the ETH Zurich and the Institute in Princeton. A better lot could hardly have fallen to a mathematician! Therefore it gave me great satisfaction that these two institutions joined hands in editing this volume of Selecta.

This letter is written to express my sincerest and warmest thanks to the one party, the Institute for Advanced Study, including you, the Trustees, and whoever among the members of the Institute had a share in accomplishing this work. I hope, it will make those papers it contains more accessible and readable, and will be consulted, at least now and then, by our young mathematicians!

Most cordially yours

/s/ Hermann Weyl

Hermann Weyl

**COPI**

Died Dec 8, 1955

✓1955

11/26

SCHOOL OF ECONOMICS AND POLITICS

Academic Organization

SCHOOL OF MATHEMATICS

RIEFLER, W.

Biographical

VEBLEN, O.

FLEXNER, A.

PANOFSKY, E.

Interview with Winfield W. Riefler, November 26, 1955.

~~Filed under 11/26/55~~

Filed in Vertical File, Interviews

1955  
GENERAL 2, 3

Academic Organization

SCHOOL OF ECONOMICS AND POLITICS 4

GENERAL 6

Publications

MEMBERS 6

ROCKEFELLER 1, 2

Foundations

FLEXNER, A. 1, 2

Biographical

RIEFLER, W. 4

AYDELOTTE, F. 1, 2, 3, 4, 5, 6

Interview with Dr. Aydelotte, November 28, 1955.

Filed in ~~Chronological~~ File under ~~11/28/55~~.

*Vertical*

*Interviews*

Interview with Dr. Aydelotte, 11/28/55

11/28

1955  
Letter to the Trustees from Veblen. Filed in V Vertical.

had / The Director called him and said that Chairman of Bd suggested that he sit with Trustee-Faculty Study group. Time arranged, but before meeting RO wrote him saying frankly that the group had more chance of coming to some clarity w/o him, and asked him to stay away.

But Veblen, advised by ~~Chern~~, (Maass), appeared, whereupon RO left room and V sat alone. Came out to find that RO was discussing with Hochschild what to do with him. So he left and wrote this letter to all Trustees. Said that Maass wanted him there because he was the only one who knew Inst history.

This from Aydelotte's files.

*This <sup>reveals</sup> source of RO's difficulties with Maass? Of course!*

EINSTEIN, ALBERT

Biographical

See Article from December, 1955 Harpers Magazine, article  
"What Einstein Was Up To."

Filed in Chronological File under 1955, December.

*New York AF April or May 1954*

Harpers Magazine, December 1955

Leonard Engel

# WHAT EINSTEIN WAS UP TO

In his later years, the greatest scientist of our era pursued a lonely goal—which few of his fellow physicists thought worth seeking—in the hope of proving that “God does not play dice with the world.”

WHEN a giant passes, it is difficult to find words that recall just how tall he was. Such a giant was Albert Einstein. Over the centuries, the Western World has produced a remarkable array of giants—Aristotle, Galileo, Darwin, Pasteur, Rutherford. A position has long since been accorded Einstein among them. But the future is likely to place him even higher, all the way up on the lofty eminence occupied hitherto by Archimedes and Newton alone.

Perhaps the best way to recall how tremendously tall he was is to look into the task on which he was engaged at the time of his death this past April. Einstein's first epoch-making papers on relativity were published in 1905; the general theory of relativity and his famous hypothesis that the “force” of gravitation is not a force at all but a property of space-time came in 1916. For most of the rest of his life, his attention was given to a single undertaking. This was the formulation of a “unified field theory.”

The unified field theory has been described many times as a theory that would bring together under a single law the phenomena of gravitation, light and other forms of electromagnetic radiation, and matter. It would do that and much more. It would also secure the foundations of a concept that lies at the heart of the whole vast edifice of modern science and technology, and of the world outlook of science's creation, modern man. The concept is that of a coherent and orderly universe.

Although he may hardly be aware of it, modern man believes deeply in an orderly and coherent universe. He thinks that nature can be puzzling, but is not capricious; and that the cry of a bird is somehow related to the stately motions of the stars. If he did not think this, he could not be sure (as he is) that the sun will rise tomorrow; nor could he have confidence in his own power to manipulate the forces of nature.

This idea of order and coherence in the universe is only an assumption. It can probably never be proved. The assumption would be greatly strengthened, however, if the universe could in fact be described as an orderly whole—in other words, if the diverse phenomena of nature could be brought under a single all-embracing law. It is just such a law that Einstein sought.

Curiously, Einstein stood nearly alone in the long search for a unified field theory. No doubt, this was due in part to the (as it turned out) appalling difficulty of the task. It stemmed also from the eager preference of most of his fellow physicists for keeping up with the rush of experiment; it is given to few to be deeply concerned with fundamentals.

But a more important factor has been the circumstance that most physicists no longer believe in the kind of orderly universe a unified field theory implies. They have another conception of nature, based on the central theory of atomic physics—quantum theory—of which Einstein, by an odd irony, was one of the original architects. Accordingly, most physicists have felt that in his later years he was pursuing a non-existent goal.

But it could be that the first long step toward the “non-existent” goal has already been achieved by the giant that Einstein was. Two years ago, shortly after his seventy-fourth birthday, Einstein announced a theory that brought together gravitation and electromagnetic waves. He was



unable to find a means of putting the theory to experimental test; it was nevertheless "highly convincing" to him. He might well have been right, though no test of it has been found to this day. In his long career, "evidence" and colleagues many times stubbornly insisted that Einstein must be wrong. More often than not, it was Einstein and not the "evidence" that finally proved right.

II

**D**URING the last twenty-two years of his life, Albert Einstein lived an outwardly simple life in a modest house on Mercer Street in Princeton, New Jersey. In his office at the Institute for Advanced Study, of which he was an emeritus member at the time of his death, he worked with the simplest of tools—pencil and paper. Likewise, the central concept of the project Einstein labored on for three decades—the development of a unified field theory—is outwardly simple.

Physicists (and other scientists) have a shorthand way of describing natural phenomena. Such shorthand descriptions are termed laws. For instance, there is a law, called the law or principle of Archimedes, describing how far into the water a floating body will sink. In physics, laws are usually put into mathematical form. This has the advantage (for those who know mathematics, at any rate) that mathematical expressions are easier to manipulate than words. Further, by suitable mathematical manipulation, it is often possible to show that two laws are related.

The unified field theory that Einstein sought is nothing more than a set of equations from which can be derived other equations describing the actions and effects of gravitation, electromagnetic waves, and matter. Physicists already have separate sets of equations for each of these phenomena. Prior to Einstein's announcement of two years ago concerning gravitation and electromagnetic radiation, none of the sets of equations had been related to each other.

Unifying theories, revealing the order beneath the changing face of nature, have been sought since ancient times. Empedocles of Sicily believed that matter was made up of varying proportions of air, water, fire, and earth as basic elements; Leucippus argued the existence of atoms; a thousand others whose names are forgotten have guessed at the ultimate nature of things. Modern seekers after a unifying theory, like Einstein, have had both an advantage and a disadvantage over their predecessors. They

have had the aid of modern mathematics, a powerful tool. At the same time, they are not free, as the ancients were, to speculate. In this day, we demand that theories of the ultimate nature of things be tested by physical reality; they must prove themselves by predicting phenomena that can be verified by observation.

The chain of events leading to Einstein's unified field theory can be said to have been initiated in 1905. In that year, Einstein, then an unknown examiner in the Swiss patent office, published his two papers on the special theory of relativity. The two papers were crammed with revolutionary concepts and insights. Among other things, Einstein settled a subtle but critically important question concerning the application of the laws of physics to moving bodies.

Throughout the nineteenth century, it was supposed that space was filled with an imponderable fluid, the ether. The ether was looked on as the medium through which light waves were transmitted. It was also (since it was held to be everywhere the same) a useful device for obtaining uniform application of the laws of light to the universe as a whole and to the various moving bodies in it.

IN THE 1880s, the American physicists Michelson and Morley performed a series of experiments—the famous ether-drift experiments—that cast doubt on the existence of the ether. Einstein's contemporaries saw with dismay the laws of light and the very structure of physics collapsing in ruins.

In the papers on special relativity, Einstein saved the day. He found a way to dispense with the ether and to apply all the laws of physics, including the laws of light, to bodies moving in an etherless space. He showed that the ether would be undetectable, even if it existed.

Actually, in the special theory of relativity, Einstein did this only for the special case of bodies moving with uniform relative motion. The question remained: could the laws of physics be applied to non-uniform motion, to systems of bodies speeding up (accelerating) or slowing down (decelerating) with reference to each other? One might imagine that they could be, but most of the then available evidence suggested that they could not. It took Einstein ten years more to show, in the general theory of relativity, that the laws of physics can be applied to *all* systems of bodies, however they may be moving relatively to each other.

In order to accomplish this, Einstein was compelled to do a curious thing. He had to cast over-



board the traditional notion of gravitation as a "force." This was necessary because gravitation as "force" implied the existence of some point (or the equivalent) out in space that was absolutely at rest. The latter was as unthinkable as ether. In place of the idea of gravitation as "force," Einstein put forward the bold hypothesis that gravitation is a property of space.

We are accustomed to thinking of space as a sort of "stage" for the material universe. Space is simply *there*, and everywhere the same, though some corners of it may be a little crowded. In the middle of the nineteenth century, the German geometer Riemann suggested that space might be of a different nature. In Riemann space, distances and other properties of space depend on what the space contains. Riemann space is distorted by the number and kinds of bodies here and there, and is not everywhere the same.

In the general theory of relativity, Einstein suggested that the universe is a type of Riemann space and not a space of the kind men had been accustomed to think of. (The particular Riemann space he had in mind has four dimensions in place of the three we are used to. Since the fourth dimension is time, this space is usually referred to as "space-time." I will refer to it simply as "space," however, as there is no need to get into the time dimension here.)

Einstein suggested further that gravitation is a property of this Riemann space. Newton's apple fell to the ground, not because apple and earth were "attracted" toward each other, but because space is so distorted by the presence of apple and earth that they tend to move toward each other. Similarly, planets go around the sun because, in the presence of planets and sun, space is so curved as to provide the "tracks" the planets actually do follow. In the language of general relativity, material bodies generate gravitational "fields" around them; the fields distort space and thereby condition the motions of bodies within the fields.

At first glance, Einstein's concept of gravitation certainly seems queer. A little reflection will show, though, that our traditional idea of gravitation is no less queer. In the traditional view, gravitation is an "attraction" which material bodies exert instantaneously upon each other. No time at all is needed for gravitational "force" to travel between two bodies, be they an inch or millions of light years apart. In other words, the "force" of gravitation is propagated with infinite velocity.

A force that travels with infinite speed should be (and would be, if we were not so used to the

idea) as great a tax upon the imagination as a "force" that is a property of space. And Einstein's view has two distinct advantages over the traditional idea of gravitation. It is consistent with the non-existence of absolute motion, and it fits the observed facts better. It was Einstein's theory of gravitation, for instance, that finally cleared up the eccentricities of the orbit of Mercury (the planet stubbornly refused, to a small but significant degree, to obey Newton's law of gravitation) and that predicted the bending of light rays passing near massive bodies like the sun (an effect confirmed by British eclipse expeditions in 1919). Moreover, Einstein's new view of gravitation led to the unified field theory.

Not long after publication of the general theory of relativity, the mathematician Herman Weyl suggested that what Einstein had done with gravitation could also be done with electromagnetic radiation. If gravitation can be represented as curvature in the special spatial geometry of Riemann, why not a geometrical representation for light and radio waves and other forms of electromagnetic force? Thus one might do away with the notion of force here, too. Furthermore, if the two geometrical representations could be connected, gravitation and electromagnetic force would have been brought under the same theoretical roof. They would be but different aspects of the same "unified field," and a great step would have been taken toward a modern unitary theory of nature.

Weyl actually found what seemed a plausible means of representing electromagnetic force geometrically. By an ingenious modification of the Riemann geometry employed by Einstein, he obtained a set of equations from which he was able to derive the famous equations that James Clark Maxwell had used to describe the propagation of electromagnetic waves. It turned out that Weyl's particular construction was unsatisfactory; as Einstein showed, it implied that atoms can be made to emit a kind of light they do not in fact give off. But Einstein was captured by Weyl's underlying idea. He pursued it, and the great goal beyond—a master theory uniting gravitation, electromagnetic force, and matter—to the end.

### III

**I**T WOULD have been extraordinary if Weyl's initial attempt to formulate a unified field theory had been successful. It would be even more remarkable if Einstein or anyone else had already arrived at the ultimate goal. Consider just two of the difficulties.

Light waves, X-rays, radio waves, and other kinds of electromagnetic radiation or force derive from the electrical nature of at least two constituents of matter (electrons and protons) in the same way that gravitation derives from the mass (or, very roughly, weight) of matter. The force generated by the electric charge of an electron is  $10^{40}$  (10 followed by 39 zeroes) times as large as the gravitational "force" associated with the mass of that electron. It is hard to see how two such disparate forces can be put under the same theoretical roof. (Said Pauli, one physicist who gave up trying, "What God has put asunder, let no man put together.")

But suppose gravitation and electromagnetic force were got into the same unified field theory. Now the theory must be made to cover the structure of matter. What this means in practical terms is that some way must be found to get from a unified field theory a mathematical representation of the fact that atoms and their constituent subatomic particles *are* particles. Similar expression must also be obtained for the fact that light and other electromagnetic waves, in some ways, also behave as particles. This is no easy task, for the equations of Einsteinian gravitation and of unified field theory cannot be made to yield "particulate" expressions by any acceptable mathematical methods now known.

SOME YEARS after Einstein pointed out the conflict between the Weyl theory and experiment, another mathematician, Theodore Kaluza, obtained Maxwell's electromagnetic equations from the gravitational equations of Einstein by adding a fifth dimension to the four of the Einstein equations. Later Oswald Veblen, then at Princeton University, showed that the fifth dimension was not a fifth dimension at all, but a mathematical quantity arising from certain procedures in four-dimensional geometry.

Einstein was intrigued by the Kaluza theory and worked with it off and on for several years, but finally abandoned it. He disliked the fifth dimension (he could not imagine what it might be) and was not convinced that Veblen had really got rid of it. Moreover, Kaluza's approach seemed to him unlikely to lead to new, previously unobserved phenomena, such as were necessary to prove any new theory a better theory than an older one. Einstein finally chose a more direct, if much more difficult tack. He would attempt to obtain both the gravitational and electromagnetic equations from a more general form of the mathematics from which he had originally obtained the gravitational equations alone.

The gravitational equations of the general theory of relativity are written in a form of mathematics that deals with quantities called tensors. A tensor is a special kind of vector. If you remember your high-school physics, you will recall that a vector is a "directed quantity"; it is a something that has a certain size and is going in a certain direction. You will also recall that the size may be specified by a set of numbers, and the direction by other numbers.

In the general theory of relativity, gravitation is represented by a tensor with ten components—that is, a tensor described by ten sets of numbers. It happens that there is a more general type of tensor, described by sixteen components—the ten needed for Einsteinian gravitation, plus an extra six. Now, the Maxwell equations for electromagnetic radiation involve six components, and they are mathematically strikingly similar to the extra six of the sixteen-component tensor.

Einstein therefore set out to build up both the gravitational and the Maxwell equations from the sixteen-component tensor. If he could accomplish this in an appropriate way, he would have at once the intimate connection he sought between gravitation and electromagnetic force. For both would then be but different aspects of the same "total field."

The approach Einstein chose was tedious and lined with pitfalls. There are actually many possible ways in which the two sets of equations might be built up. In most, any real connection between the gravitational and electromagnetic equations is lost. Unfortunately, the exploration of each possible method of constructing the two sets of equations required months of mathematical labor. Electronic computing machines would have been no help, even if they had been in existence when Einstein began. Calculating machines perform numerical computations only; they do not solve problems in abstract analysis, the realm of mathematics here involved.

In an appendix to the 1953 edition of *The Meaning of Relativity*, the book in which he gives his own account of his work on relativity, Einstein announced that he had finally derived equations for the gravitational field and electromagnetic force from equations of the "total field." He felt that the procedures he had employed were valid, and that he had achieved a genuine unification of gravitation and electromagnetic force.

In this formulation of unified field theory, the general theory of relativity's representation of gravitation as curvature of space is preserved.

John F.  
Wm?



The new form of electromagnetic force, however, is difficult to spell out. So far, the new equations have yielded no clear geometrical interpretation of electromagnetic radiation, no hint of what the things we know as electromagnetic waves might really be.

Moreover, it may be a long time before predictions of observable new phenomena—which alone can provide a test of the new theory—are forthcoming. The equations of the gravitational and unified field theories belong to a class of equations known as non-linear partial differential equations. This class of equations has been, for more than a century and a half, the unexplored tropical jungle of mathematics. Aside from approximate arithmetical methods, which are not always feasible even with the aid of a calculating machine, there are no general methods of solving these equations, only special methods that apply to a particular very few of them. More or less by luck, there were special cases of the gravitational equations that could be solved and that led to readily verifiable predictions, such as the correct orbit of Mercury. No comparable circumstance has turned up thus far in connection with Einstein's unified field theory. Indeed, it seems unlikely that one will, for the equations of the new theory are much more complicated than those of the original gravitation theory. Accordingly, a test of the theory—as also its extension to the third primary of the universe, matter—may have to wait on the discovery of new methods of dealing with non-linear partial differential equations. That is a task that could well take many able mathematicians decades to accomplish.

#### IV

THE story should also be told of how and why a unified field theory, such as Einstein's, is in conflict with quantum theory, the great and paradoxical hypothesis underlying modern atomic physics—and how and why Einstein felt he had to make a choice—and why he elected to give up quantum theory, a theory he himself had been instrumental in establishing.

Quantum theory originated in 1900 in a suggestion advanced by Max Planck to explain some puzzling aspects of the manner in which a solid body (such as a chunk of carbon) gives off light as it is heated to incandescence. Planck suggested that, while light and other forms of radiant energy are obviously wave-like in form, light is given off by a glowing body in discrete packets, which he termed quanta (now also called

photons). In other words, although visible light, infra-red rays (radiant heat), radio waves, and other forms of electromagnetic energy are waves and travel through space as waves, they are also particles of a kind. Later, it was shown that what we ordinarily think of as particles—electrons, protons, and so on—likewise exhibit dual behavior. They are particles, but under certain circumstances they behave and can be treated as waves.

At first, the quantum theory had rocky going. The "wavicle" (as humorous physicists dubbed the wave-particle what-is-it) appeared to many as an outrageous logical contradiction; it was certainly difficult to imagine. Planck himself scarcely believed in the quantum theory, and it did not get anywhere until Einstein took it up and, with characteristic brilliance, used it to solve outstanding problems of heat and light. The "wavicle" thus became respectable, and an uncommon unintelligibility became a common unintelligibility; today, nearly all physicists accept the "wavicle."

For all the successes of quantum theory, however, Einstein and some other of the older physicists did not forget that the "wavicle" involves serious logical difficulties. Einstein was troubled by them to the end of his life.

Einstein was even more deeply troubled by a matter of observation that has been elevated into an axiom of quantum theory and to a basic principle of natural law. The observation is the simple fact, noted in many laboratories, that we cannot look too closely into an atom. If, for example, we seek to learn the position of an electron within the atom, we may not find out how fast it is traveling in its tiny orbit. And if we seek to know its momentum, we may not learn its position. This follows from the fact that we can peer inside an atom only by using a probe of some sort—a ray of light, for example. But a ray of light is made up of photons or quanta, which are "bullets" that cannot fail to move or disturb the electron in some way, and hence cannot but introduce an element of uncertainty into what is being observed.

THIS has been elaborated into the famous Uncertainty Principle of Werner Heisenberg. The Uncertainty Principle states that there is a limit to what may be known of natural phenomena. Natural events cannot be fully described or (which is the same thing) determined; they are only more or less probable, never certain.

There is no doubt that the Uncertainty Principle states a very real difficulty of experimental observation, particularly in atomic physics. No

one today sees any way of getting around it. Einstein was as aware of the difficulties as any other physicist.

In the true sense of the word, however, Einstein was a classicist. He was unwilling to give up the classical conception (going back to Newton and earlier) of an orderly universe, where *all* events are fully determined and where effect follows cause as the night the day. ("I cannot believe," runs his well-known remark, "that God would choose to play dice with the world. . . . *Raffiniert ist der Herr Gott, aber boshaft ist Er nicht.*") He was unwilling to give up—as the Uncertainty Principle said he must—the classical goal of science, the complete description of nature.

Another of Einstein's objections to quantum theory is more a matter of logic and less of feeling. Up to the present time, quantum theorists have found it necessary to employ in their studies something called an inertial system; try as they have, they have not been able to do away with it. An inertial system involves, as does gravitational "force," the idea of absolute rest and a kind of absolute motion (absolute acceleration). But absolute acceleration is one of the very things Einstein did away with in general relativity. In other words, if quantum theory is retained, then one must abandon the theory of relativity and also relativity's offspring, the possibility of a coherent picture of the universe as a whole in the form of a unified field theory.

In the two years between publication of his unified field theory and his death, Einstein gave no indication of progress toward a test of it; or toward deriving from it equations that describe matter and that might in time supplant the quantum theory in atomic physics. However, in a letter to the *Physical Review*, the chief journal of American physicists, Einstein once suggested a way in which atoms might ultimately—when

more is known of the mathematics concerned—be got out of his equations.

This is not the place to attempt to give the details of his proposal. I will observe only that it is perilous to assert that he was wrong. For Einstein's most marked characteristic was ever a remarkable instinct for the grain of truth hidden in a labyrinth of confusing appearances.

A recent development in cosmology (the science of the form and history of the universe) illustrates this well and furnishes a fitting epitaph. When Einstein formulated the first equations for the form of the universe nearly forty years ago—and thereby inaugurated the modern study of cosmology—he was forced, by certain assumptions he had made, to include an arbitrary correction factor in his equations. Otherwise the equations would not apply to the kind of universe depicted in general relativity. The correction factor, called *lambda* or the cosmological constant, turned up again when another theory of the universe was put forward by the Abbé Lemaître, and in still other theories of the universe advanced by others later on.

In the meantime, Einstein, who had never liked it, had abandoned *lambda*. When others pointed out that *lambda* was required by known astronomical data, Einstein replied that *lambda* destroyed the elegance of the equations and the data might well prove wrong.

The data concerned related to the size and age of the universe. They were wrong. Better figures were finally worked out three years ago at observatories here and abroad. When these were used, it turned out that *lambda* wasn't needed to balance the cosmological equations at all. *Lambda* could be dropped, as Einstein had said it should three decades before. Once more, the modest man with the saintly mien had shown that he knew, better than any man since Isaac Newton, where lay the hidden grain of truth.

## MAN WITHOUT A FUTURE

AS AN administrator Winston Churchill has been cautious to excess and followed his chief war adviser, Admiral Lord Fisher, very closely . . . no great or original stroke of genius need be expected from him in any place. . . . He reads only to prepare his speeches and has no other artistic tastes. But, on the other hand, he is easy of approach and his heart is in his work; he listens to everyone, even though he cannot grasp all that is said to him; in fine, he is an excellent subaltern: capable, industrious, and supremely courageous, but not a pathfinder or great leader of men.

—Frank Harris, *Contemporary Portraits* (3d Series), 1920.

December

PRINCETON UNIVERSITY

Relations WOAI

MOREY, C. R.

Biographical

An appreciation of Charles Rufus Morey by Rensselaer W. Lee on the occasion of Morey's death.

"In the case of another Princeton institution, his altruism and objectivity were to have an important effect on humanistic studies in America. The Institute for Advanced Study, founded in 1930, had on its original faculty a distinguished group of mathematicians and theoretical physicists. When, four years later, the time came to expand its activities, Morey was largely responsible for the appointment of a number of eminent humanists, including historians of eastern as well as western art. The historians of art were German scholars of great distinction, a part of that group of remarkable exiles--in his own words, 'backhanded gifts of Hitler to America'--who have 'enriched and deepened American scholarship in our field.'"

From The Art Bulletin of December, 1955 in Panofsky's files

WEYL, Hermann

Biographical

Resume of Weyl's life, public works

*Filed in Chrono. file*

Source: D Weyl, Hermann



**C O P Y**

Bergstrasse 27  
Zurich

December 6, 1955

Professor Robert Oppenheimer  
Director, Institute for Advanced Study,  
Princeton, N. J.  
U. S. A.

Dear Robert:

My letter of Nov. 27 was incomplete: I forgot to mention the most important item: the "Selecta Hermann Weyl", a provisional copy of which was handed over to me by Prof. Eckmann at a banquet given to me by the Department of Mathematics and Physics of the Eidgenössische Technische Hochschule on the eve of my seventieth birthday. The publishers Birkhäuser in Basle did a fine job: it is an impressively looking volume. I got wind of the enterprise first from you, but was soon asked by the Zurich people for cooperation concerning a few details; in particular they discussed the selection of papers with me.

Apart from the few years in Göttingen, first as Privatdozent and then as Hilbert's successor, my whole scientific life was divided between the ETH Zurich and the Institute in Princeton. A better lot could hardly have fallen to a mathematician! Therefore it gave me great satisfaction that these two institutions joined hands in editing this volume of Selecta.

This letter is written to express my sincerest and warmest thanks to the one party, the Institute for Advanced Study, including you, the Trustees, and whoever among the members of the Institute had a share in accomplishing this work. I hope, it will make those papers it contains more accessible and readable, and will be consulted, at least now and then, by our young mathematicians!

Most cordially yours

/s/ Hermann Weyl

Hermann Weyl

**C O P Y**

1955

12/9

WEYL, HERMANN

Biographical

Date of his death in Zurich.

A File, Hermann Weyl



1955  
~~XX~~ GIFTS

Finance

MIGDEN, MORRIS (Counselor-at-law)

Biographical

Migden, Morris, Counselor-at-law, to the Institute,  
December 19, 1955.

He has a client who ~~xxxxxxx~~ desires to include in  
his will a provision bequeathing to the Institute a certain  
sum of money.

/ D File, Donations

FULTON, JOHN F.

Biographical

KENNAN, GEORGE

John F. Fulton to Oppenheimer December 31, 1955,  
regarding the appointment of Kennan to the Institute, and the  
high regard shown for him by professional historians.

Letter filed in Chronological file under 1955, 12/31.

D, Kennan, George

YALE UNIVERSITY SCHOOL OF MEDICINE  
333 Cedar Street . New Haven 11 . Connecticut

Department of the History of Medicine  
Historical Library

31 December 1955

C O P Y

Dr. Robert Oppenheimer  
Institute for Advanced Study  
Princeton, New Jersey

My dear Robert:

By now you will have seen the notice of George Kennan's address as given in the New York Times. I heard it more or less by accident as Kennan at a distance looks like our President, Lynn Thorndike. It was really a most magnificent speech and more than a thousand professional historians in attendance gave him a rousing, standing ovation after he had finished. Individual historians hold him in the highest regard and they feel that the Institute should be congratulated on his appointment there. A critical fellow like I. Bernard Cohen went out of his way to tell me this--also Harry Rudin.

Very sincerely yours,

/s/ John

John F. Fulton, M.D.

Copy to Mr. Wilmarth S. Lewis