

HISTORICAL STUDIES LIBRARY  
THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

ITEMS REMOVED : WEIL, ANDRE - PROF. MATH 1960-

1) Reprint from Proceedings of the International Congress of Mathematics, Helsinki, 1978.

2) Review of Gotthold Eisenstein's Mathematischer Werke, by Andre Weil, in Bulletin of the American Mathematical Society, Vol. 82, No. 5, September 1976.

3) Book Review of Joseph E. Hoffman's Leibniz in Paris 1672-1676 : His Growth to Mathematical Maturity, by Andre Weil, in Bulletin of the American Mathematical Society.

THE INSTITUTE FOR ADVANCED STUDY

Princeton, New Jersey 08540

HARRY WOOLF  
Director

October 18, 1983

FAC  
EMERITUS

Professor André Weil  
School of Mathematics  
Institute for Advanced Study

Dear André:

I thought you might like to have a copy of  
this photograph taken of you during the May Day  
reception at Marquand House last spring.

Cordially yours,



Harry Woolf

Enclosure

[in photo collection]

THE INSTITUTE FOR ADVANCED STUDY

Princeton, New Jersey 08540

HARRY WOOLF  
Director

March 16, 1983

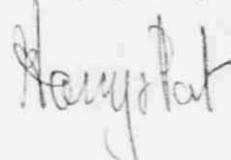
Mrs. André Weil  
42 Veblen Circle  
Princeton, New Jersey 08540

Dear Mrs. Weil:

I have just learned both of your sudden illness and of your return to Princeton. I am writing to wish you the very best, and a speedy and comfortable recovery.

With warm regards, we are,

Cordially yours,



Pat and Harry Woolf

5 December 1980

Professor André Weil  
School of Mathematics  
Institute for Advanced Study

Dear André:

In accordance with prevailing precedures covering acquisition by the Institute of works of art, I presented to the recent meeting of our Board the opportunity for acquiring the Oppenheimer portrait which you so kindly brought to our attention. After examining the photograph which you had provided, and which I return enclosed, the Trustees decided not to acquire the portrait.

I regret having to disappoint you in this matter and wish again to express our gratitude to you for thinking of the Institute in this connection.

With best regards, I am

Cordially yours,

Harry Woolf

enclosures: color negative  
black-and-white photograph

August 27, 1980

Professor André Weil  
3 rue Auguste-Comte  
75006 Paris  
France

Dear André:

Chantal and I recall with great pleasure the delightful afternoon we spent with you and Evaline in Paris. I trust that by now the weather has turned fine and that you are able to enjoy the Luxembourg Gardens—and so much else—in warmth and sunshine. As you may have heard, the heat here has been remarkable this summer and shows no sign of letting up. We long for some of the rain and cool weather that displeased me so much in Paris.

I have reported to the Director about the portrait of Robert. At the suggestion of the Board, a committee has now been formed to consider and pass on the acquisition of art works by the Institute, through gift or purchase. The matter of Robert's portrait will be presented to the committee this fall. I would imagine that a decision will be forthcoming by mid-October.

Chantal joins me in sending our affectionate regards to you both.

As ever,

John Hunt

*AW*

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

October 29, 1979.

SCHOOL OF MATHEMATICS

Dr. Harry Wolf  
I.A.S.

Dear Harry:

Many thanks for your letter and the kind words about the Wolf prize.

As to the Oppie portrait, it is of course hardly likely that I should ever come across a potential donor; but I am happy to hear that you will keep your eye open for such a person, and I am grateful for your suggestion (implicit at the end of your letter) to have the portrait brought to Princeton. I expect to have an opportunity for having this done soon.

Cordially yours

*A Weil*

A. Weil

October 25, 1979

Professor André Weil  
School of Mathematics  
Institute for Advanced Study

Dear André:

I am writing to tell you how pleased I was to learn recently that you had been named a co-recipient of the Wolf Prize in Mathematics. Congratulations to you for an honor well deserved.

May I also take this occasion to refer to the photograph of the painting of Oppenheimer which you passed on to John Hunt. It seems extremely well done and most attractive. Indeed, it would be wonderful if the Institute could own it, but I fear I cannot commit Institute monies to its purchase. If, however, you should hear of a donor who might wish to purchase it for us I would be delighted to make whatever arrangement is necessary in that case. In the meantime, I shall certainly keep my eye out for such a possible donor, though individuals who do not know the painting themselves are not likely to be interested.

With warm regards and best wishes, I am,

Cordially yours,

Harry Woolf

OFFICE OF PUBLIC RELATIONS  
ROCHESTER, NEW YORK 14627  
(716) 275-4119  
Contact:

# News from the University of Rochester

Gloria Peterson, 275-4127

October 17, 1979

For immediate release

Andre Weil, a recent co-recipient of the prestigious Wolf Prize in mathematics, will lecture Friday, Oct. 26, at the University of Rochester. His lecture, entitled "Some Aspects of Leonard Euler's Life and Works: A Study in 18th Century Mathematics," will be given at 2 p.m. in room 140 of Hutchison Hall. It is open to the public free of charge.

Weil, a respected mathematician and a leader in the fields of number theory and algebraic geometry, was honored by the Wolf Foundation with half of the \$100,000 award in mathematics in recognition of his contributions to the field. Weil's "Collected Papers, 1926-78," published in three volumes in 1979, reflect his wide range of interests and the impact his work has had on many areas of contemporary mathematics.

A native of France, Weil has been a permanent member of the Institute for Advanced Study at Princeton since 1957. He was named professor emeritus there in 1978.

Weil is a founder and one of the most influential members of the famous group of French mathematicians whose members write under the pseudonym Nicolas Bourbaki. In an effort to reform graduate education in pure mathematics, the group for many years has been producing volumes of an expository treatise "Elements of Mathematics."

While at the University, Weil will give a colloquium entitled "History of Pell's Equation" on Wednesday, Oct. 24, at 4:30 p.m. in room 201 of the Mathematical Sciences Building. Weil's visit is sponsored by the University's Department of Mathematics.

August 1, 1979

Dear Andre:

I was delighted to learn of the news of your award. Heartiest congratulations. The honor tendered to you also dévolves upon all of us.

Cordially yours,

Harry Woolf

Professor Andre Weil  
School of Mathematics

cc: JH

August 1, 1979

Mr. Y. Gruder  
Director General  
The Wolf Foundation  
P. O. Box 398  
Herzlia Bet  
Israel

Dear Mr. Gruder:

Thank you very much for your letter of 16 July 1979 informing us that Professor André Weil shares in the Wolf Award in Mathematics this year. We are honored and delighted and appreciative.

Sincerely yours,

Harry Woolf

cc: Professor Andre Weil

# THE WOLF FOUNDATION

P. O. B O X 3 9 8  
HERZLIA BET (ISRAEL)  
TELEPHONE (03) 937723  
CABLES: FOUNDATION - HERZLIYYA

HERZLIA BET (ISRAEL), July 16, 1979

Messrs.  
THE INSTITUTE FOR ADVANCED STUDY  
Princeton, New Jersey 08540  
U. S. A.

Attention: The President

Dear Mr. President:

We wish to congratulate you most heartily and your Institute on the selection of Professor ANDRE WEIL for the award of the 1979 WOLF PRIZE in MATHEMATICS.

Our Foundation is honoured and proud that such a famous scientist as Prof. Weil, of the highest international standing, is the recipient of our award.

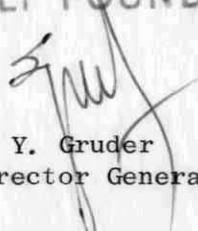
The solemn prize-awarding ceremony shall take place at the Knesset (Parliament of Israel) on September 12, 1979, in the presence of the President of the State, Ministers and other national and foreign dignataries and academic authorities.

Enclosed herewith is a copy of the material released by the Minister of Education and Culture of Israel to the media. Your Institute may freely publish all or any part thereof and we would appreciate receiving a copy of every publication concerning our prizes. Please do not hesitate to request any additional information you may require.

With kindest greetings, we are pleased to remain,

Sincerely yours,

THE WOLF FOUNDATION

  
Y. Gruder  
Director General

# THE WOLF FOUNDATION

P.O. BOX 398  
HERZLIA BET - ISRAEL  
Cables: FOUNDATION - HERZLIYYA BET

קרן וולף

ת.ד. 398 - הרצליה ב'  
מברקים: פאונדריישן הרצליה

" WOLF PRIZES - 1979 "

AWARDED IN AGRICULTURE - MATHEMATICS - CHEMISTRY - PHYSICS - MEDICINE

BY THE RESPECTIVE PRIZE COMMITTEES OF THE WOLF FOUNDATION

AGRICULTURE - to be shared equally by:

Distinguished Prof. JAY L. LUSH Iowa State University Iowa, U. S. A.	and	Dr. Sir KENNETH BLAXTER Rowett Research Institute Aberdeen, Scotland, U.K.
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MATHEMATICS - to be shared equally by:

Professor Emeritus JEAN LERAY College de France Paris - France	and	Professor Emeritus ANDRE WEIL Institute for Advanced Study Princeton - U. S. A.
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CHEMISTRY -

Professor Emeritus HERMAN FRANCIS MARK  
Polytechnic Institute of New York  
New York - U. S. A.

PHYSICS - to be shared equally by:

Prof. GEORGE UHLENBECK Rockefeller University New York - U. S. A.	and	Prof. GIUSEPPE OCCHIALINI University of Milan Milano - Italy
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MEDICINE - to be shared equally by:

Dr. ROGER W. SPERRY California Inst. of Technology California - U. S. A.	Dr. ARVID CARLSSON Gothenburg University Gothenburg - Sweden	Dr. OLEH HORNYKIEWICZ University of Vienna Wien - Austria
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GENERAL INFORMATION

AMOUNT OF THE PRIZES.- The WOLF PRIZE in each of the 5 aforementioned fields of science amounts to US\$ 100,000,00. In the event that one of the prizes should be jointly awarded to two or three scientists, the sum of US\$ 100,000,00 is to be equally shared by them.

THE PRIZE COMMITTEES.-

There have been 5 Prize Committees, one for each field of science. Each Committee was formed by 3 members, all of them Professors of worldwide renown in their respective fields, including five Nobel Prize Laureates.

Each Prize Committee submitted its decision together with the reason for their recommendation and an evaluation of the prize-winners' achievements, as summarized in the enclosed memorandum.

The Wolf Foundation is deeply grateful to the members of the Prize Committees for their devoted and exhaustive work, solely aimed at awarding the prizes to the most deserving scientists in each area, for their achievements on behalf of humanity, regardless of nationality, race, colour, religion, sex or political views.

The decisions of the Prize Committees are final and irrevocable.

DECISIONS OF THE 5 PRIZE COMMITTEES SET UP FOR THE AWARD OF THE

1979 "WOLF PRIZES" IN THE FOLLOWING FIELDS OF SCIENCE:

AGRICULTURE - MATHEMATICS - CHEMISTRY - PHYSICS - MEDICINE

AGRICULTURE

The Prize Committee unanimously agreed that the Wolf Foundation Prize in Agriculture for 1979 should be awarded equally to:

Distinguished Professor Jay L. LUSH  
Iowa State University  
Iowa - U. S. A.

and

Dr. Sir Kenneth BLAXTER  
Rowett Research Institute  
Aberdeen - Scotland - U.K.

Professor Lush has made major contributions to unravelling the hereditary contributions to animal production whereas Dr. Blaxter has unravelled the nutritional requirements of animals, especially ruminants. Thus their work has effectively contributed to both aspects of the factors regulating animal production: the control and exploitation of the genetic endowment, and the provision of the most favourable nutritional environment in which genetic endowment can be expressed.

Distinguished Professor Jay L. LUSH (Born 1896 - U.S.A.)

He has done more than any agricultural scientist both to investigate the genetic basis of traits important for animal production, to assess their value and to improve them by initiating breeding programmes of proven practical effectiveness. He has been responsible for inspiring a great band of graduate students and others who have disseminated his ideas and practical suggestions throughout the world and so led to the improvement of poultry, pigs, beef and dairy cattle. His contributions are of several kinds. First, he pioneered the value to the scientific breeder of adequate measurement of the performance of individuals, their progeny and their pedigree in order to assess the genetic worth of an animal. Secondly, he pioneered the assessment of the "heritability" of a trait, i.e. the degree to which its expression reflected a genetic basis rather than the effects of a favourable or unfavourable environment. Thirdly, having demonstrated how the inherited potentialities could be measured and distinguished from those due to non-heritable causes, he synthesized these ideas into practical and workable animal breeding plans to promote an inherited increase in the yield of meat, milk or eggs. He has exploited his ideas as a University teacher, at a diversity of national and international gatherings and enshrined much of it in his major and most influential text "Animal Breeding Plans". He may truly be described as the "father" of scientific animal breeding in the twentieth century.

Dr. Sir Kenneth BLAXTER (Born 1919 - U.K.)

Dr. Blaxter has spent virtually the whole of his career in the British Agricultural Research Service. Nevertheless, he has disseminated his discoveries and ideas through the media of international conferences, farming meetings and via the many visiting scientists who have worked with him at his research institutes. He is particularly distinguished for the precise and detailed studies he has made on the energy requirements of ruminants and the ways, once the necessary energy has been supplied to the diet, that it is utilized in the animal's metabolism. This has led to a new understanding, both of the nutritional needs of the animal and of the most effective ways in which the diet may be made up and varied, and utilized most efficiently by the ruminant to produce more meat, milk or both. Thus the farmer can now control this aspect of the animal's environment with far greater efficiency to give a higher yield at the most economical price.

His approach and practical proposals have been widely adopted throughout the world and, because he has enunciated the fundamental principles so clearly, it has proved possible to adapt or modify them to a diversity of farming systems.

## MATHEMATICS

The Prize Committee for Mathematics has decided that the prize for mathematics for this year should be divided between:

Professor (Emeritus) Jean LERAY                      and                      Professor (Emeritus) André WEIL  
College de France - Paris - France                      Institute for Advanced Study, Princeton, U.S.A.

Both these mathematicians have made outstanding contributions in many different areas of mathematics and their work has had very great impact on the development of mathematics over the past decades.

JEAN LERAY (born 1906 - France) - For pioneering work on the development and application of topological methods to the study of differential equations.

His major contributions include his work on the equations of fluid mechanics, his use of topological methods in analytical problems, his development of entirely new techniques which have altered the whole direction of algebraic topology, and very significant work on the theory of hyperbolic differential equations.

He is a member of the Academies of Science of Paris, Belgium, U.S.A., U.S.S.R., Italy, Poland and others, and Doctor Honoris Causa of many Universities. His work is of very unusual broadness, spanning from the most abstract part of Mathematics - where Leray himself invented extremely general abstract tools - to very concrete applications and at the same time of a remarkable unity; all the new concepts and methods are applied to very specific problems taken amongst the most challenging of the science of our time.

ANDRE WEIL (born 1906 - France) - For his inspired introduction of algebro-geometry to the theory of numbers.

He has made important contributions in harmonic analysis, differential geometry, and aspects of Lie group theory, but his most outstanding achievement has been in the development of algebraic geometry and its application to important problems in number theory.

Since 1957, he is Professor at the Institute for Advanced Study in Princeton and his career is singularly rich in achievements. Among his contemporaries, he has long occupied a unique position by combining originality and creativity to the highest degree, with an encyclopedic knowledge and deep understanding of most areas of contemporary mathematics. He is furthermore a formidable scholar of classical mathematics, whose historical insight and perspective - particularly in the field of number theory - is unequaled among mathematicians today.

## CHEMISTRY

The Wolf Foundation Prize Committee in Chemistry for 1979 has selected:

Professor (Emeritus) Herman Francis MARK  
Polytechnic Institute of New York - U.S.A.

for the Wolf Prize in Chemistry, for his contributions to understanding the structure and behavior of natural and synthetic polymers.

HERMAN FRANCIS MARK (born 1895 - Austria). His contribution has had a major effect upon the academic understanding of this important class of materials which in nature play a central role not only in the structure of the living cell but in its function as well. Herman Mark's scientific contribution and personal interest have played a major role in the development of synthetic materials on a huge scale everywhere. Today's use of these synthetic materials has changed the style of life throughout the world.

Since 1940 Professor of Organic Chemistry at the Polytechnic Institute of New York, Prof. Mark has published over 500 original and review articles and has written about 20 books on various topics related to polymer chemistry. Doctor Honoris Causa at 17 Universities and Polytechnics, member of 18 Academies of Science throughout the world, among them U.S.A., U.S.S.R., Holland, Germany, Austria, India, Etc., Prof. Mark has received a great number of medals and awards since 1928.

## PHYSICS

The members of the Prize Committee for the Wolf Prize in Physics have unanimously agreed that the prize this year should be divided equally between:

Prof. George E. UHLENBECK  
Rockefeller University - New York - U.S.A.

for his discovery, jointly with the late Samuel A. Goudsmit, of the electron spin;

and Prof. Giuseppe OCCHIALINI  
University of Milan - Italy

for his contributions to the discovery of electron pair production and of the charged pion.

GEORGE UHLENBECK (born 1900 - Netherlands). His discovery, jointly with the late Samuel A. Goudsmit, of the electron spin, not only had major implications in physics and chemistry, but also provided the first example of an internal degree of freedom for an elementary particle. Prof. Uhlenbeck is also an outstanding figure in statistical mechanics.

GIUSEPPE OCCHIALINI (born 1907 - Italy). He has contributed to the discovery of electron pair production, jointly with P.M.S. Blackett and J. Chadwick, and to the discovery of the charged pion, jointly with C.M.G. Lattes, H. Muirhead and C.F. Powell. Giuseppe Occhialini has also contributed to major research techniques including cloud chambers triggered by counters and the use of special photographic emulsions to study cosmic rays.

## MEDICINE

The Wolf Foundation Prize Committee in Medicine has decided that the Wolf Prize in Medicine for 1979 shall be equally shared by:

Dr. ROGER W. SPERRY	Dr. ARVID CARLSSON	Dr. OLEH HORNYKIEWICZ
California Inst. of Technology	Gothenburg University	University of Vienna
Pasadena - Calif., U.S.A.	Gothenburg - Sweden	Vienna - Austria

for outstanding contributions in brain physiology and physiopathology.

ROGER W. SPERRY (born 1913 - U.S.A.), for his studies on the functional differentiation of the right and left hemispheres of the brain. Since 1954, Professor at the California Institute of Technology, Dr. Sperry is a member of the National Academy of Sciences, American Philosophical Society, The Royal Society and others. He received honorary doctorates from Cambridge Univ. (1972) and from the University of Chicago (1976), and was elected California Scientist of the Year in 1972.

ARVID CARLSSON (born 1923 - Sweden), for his work which established the role of dopamine as a neurotransmitter. Professor at the Univ. of Lund, Sweden until 1959, he is since then Professor of the Dept. of Pharmacology at the University of Gothenburg; he is a member of the Royal Swedish Academy of Sciences, and others. Dr. Carlsson received various Prizes and awards, among them the "Jahre's Medical Prize" in 1974. He has published almost 300 articles, a considerable part of them dealing with the occurrence and functions of dopamine in brain. Dr. Carlsson's work has had an impact on basic as well as clinical brain research.

OLEH HORNYKIEWICZ (born 1926 - Poland), for opening a new approach in the control of Parkinson's disease by L-Dopa. Professor of Biochemical Pharmacology at the University of Vienna and Professor at the University of Toronto, Canada, member of Professional Societies in Austria, Canada, U.S.A., Germany, etc., he has received the Gold Medal - Canadian Parkinson's Disease Association, a Special Tribute from Columbia University, New York, and several other Prizes and awards.

cc: Wisnovsky

28 November 1978

Dear Andre:

The Institute for Advanced Study is now in the process of preparing an Einstein Centennial Celebration in honor of the one-hundredth anniversary of Albert Einstein's birth.

A principal feature of the Celebration will be a Symposium to be held at the Institute on March 4-9, 1979, dealing with the specific aspects of Einstein's scientific work. The emphasis throughout will be on both the historical context and the continuing importance of Einstein's ideas in various fields, perhaps bearing in mind Einstein's remark that "the most incomprehensible thing about the world is that it is comprehensible."

The Planning Committee for the Symposium consists of the following members:

Freeman Dyson  
Herman Feshbach  
Marvin Goldberger  
Gerald Holton  
Martin Klein  
Abraham Pais  
John Wheeler  
Harry Woolf (Chairman)

The audience for the Symposium and its published product will be on the one hand the community of scientists of the present and immediate future and, on the other, future historians who will look to this record for some answers to the questions of how Einstein and the physics he helped to create influence, either explicitly or tacitly, the science being done today.

Dr. Andre Weil  
Page 2

It is our intention that the Symposium be an occasion where scientists and scholars can reflect on what science is, and how at its best it is carried out, with specific reference to Einstein's work.

On behalf of the Institute for Advanced Study and the Planning Committee, I am writing to invite you to participate in the Einstein Centennial Symposium. The attached preliminary program will give you a sense of the substance of the meeting; further details will be sent to you at a later date.

I look forward to hearing from you soon, and very much hope that your answer will be affirmative.

Cordially yours,

Harry Woolf

Dr. Andre Weil  
42 Veblen Circle  
Princeton, NJ 08540

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

Telephone-609-924-4400

THE DIRECTOR

February 15, 1978

FILM PRESENTATION

A film entitled Pilgrim of the Absolute - The Life and Death of Simone Weil, will be shown in the Library Seminar Room on February 28 at 4 o'clock. The length of the film is approximately 70 minutes.

Professor André Weil will present the film and answer questions following the screening.

The Institute family is cordially invited to attend.

Harry Woolf

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The Institute family is cordially invited to attend.

Harry Woolf

February 15, 1978

Dear Professor Weil:

I have made arrangements through Mr. Blasius to secure the film on Simone Weil which we discussed.

The present plan is to show the film on February 28 at 4 o'clock in the Library Seminar room. I understand that the film presentation will take about 80 minutes altogether. Would it be possible for you to present the film, and answer questions following the screening?

I will wait for your reply before posting notices on the bulletin boards.

With best regards, I am

Sincerely yours,

John Hunt

Professor André Weil  
School of Mathematics

May 5, 1977

Professor Andre Weil  
School of Mathematics  
Institute for Advanced Study

Dear Andre:

I have just learned that you were elected  
a Foreign Associate of the National Academy of  
Sciences. My warmest congratulations to you.

Cordially yours,

Harry Woolf

March 31, 1977

Professor Andre Weil  
School of Mathematics  
Institute for Advanced Study

Dear Professor Weil:

Thank you so much for your helpful letter of 16 March 1977. Forgive my delay in replying until now, but I left almost immediately after your note came and have only returned this day. I would like to talk to you about this and other matters and so I am especially grateful for your invitation to do so, but between now and the forthcoming meeting of the Board there is much that presses upon me and I ask for your forbearance in delaying that conversation.

Sincerely yours,

Harry Woolf

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

March 16, 1977

Dr. Harry Woolf  
Fuld Hall

Dear Harry:

Although the normal flow of information about events affecting life at the Institute does not reach retired professors, I could not for long remain unaware of the unwelcome news of your predecessor's impending return, nor could it leave me indifferent.

There is no impropriety, I hope, in my telling you that I fully share the concern of not a few of my colleagues (perhaps I am supposed to say "former colleagues") at this prospect. I trust that everything within your powers will be done to minimize the impact of the presence of such a divisive element in our little community.

Should there be any aspect of this situation which you might wish to discuss with me, I remain of course entirely at your disposal.

Sincerely yours,



A. Weil

AW:MMM

*flw*

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

March 31, 1977

School of Mathematics  
Institute for Advanced Study

Dear ex-Colleagues:

Many thanks for making my assistant seven-eighths of a member. You seem to have realized that my assistant's fund is totally inadequate for its declared purpose, but to have decided that a normal member's stipend would be extravagantly generous in such a case.

I confess I had not expected from you that kind of petty behavior. It has not increased my respect for the collective wisdom of the School. On the other hand, it increases my satisfaction at not having to take part in School meetings any more.

I take this as a clear hint that the School does not welcome even such modest requests from me. I am obliged for the lesson. I shall keep it in mind in the future.

Sincerely,



A. Weil

Professors Borel  
Harish-Chandra  
Langlands  
Milnor  
Montgomery  
Selberg  
Whitney

✓ CC: Dr. H. Woolf

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

March 1, 1974

The Faculty  
I. A. S.

Dear Colleagues:

The analogies between the I. A. S. and Washington become more and more striking. By now none of us would be surprised to find that his phone is being bugged.

In the matter of leaks, I should like to remind you of the following:

1. In recent years, at least two temporary members of the "Program on Social Sciences" (as it was then known) boasted publicly that their permanent appointment to the Institute was impending, and, when this did not materialize, they passed the word around that financial considerations had blocked this.

2. It has never been denied that the proposed appointment of R. Bellah had been discussed between Dr. Kaysen and Bellah, either before the latter came to Princeton or shortly thereafter. This, as you know, became an important factor in the controversy around him.

3. The "Memorandum to the Faculty," dated January 30, 1973, which was handed over to the press by Dr. Kaysen and/or Mr. Dilworth in March 1973 contained the following paragraph:

"Three of the five members of the Ad Hoc Committee who were professionally most directly qualified to evaluate Bellah - namely, the two sociologists and the historian of Japan - all expressed strongly positive views of his merits. So did the other leading historian of Japan whose opinion was asked, and so did the Director, himself a social scientist. The other two Ad Hoc Committee members gave, respectively, weak support, and a view which can be described as doubtful."

Since the names of the five Committee members were on record and were easily identifiable from the above, this constituted a flagrant breach of confidentiality, whose responsibility lies squarely on the Director and/or Trustees.

2 - The Faculty, I. A. S.

March 1, 1974

4. Concerning the "leaking" of individual sentences from the Committee members's report, it has never been established where this occurred. But not a few colleagues outside Princeton have not failed to notice that, out of those sentences, five were laudatory, two were doubtful and one was adverse, and they have been led to wonder whether the leak did not in fact come either from Dr. Kaysen or possibly from an over-zealous supporter of his.

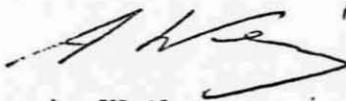
5. The first intimation that I, personally, received that a nomination from the Committee on Social Sciences was impending came to me from someone who is not a Faculty member. When I thereupon approached the representative of my School on that Committee, he was embarrassed, told me that this was still at a "confidential" stage, but eventually confirmed it and gave me the name of the person under consideration.

6. I know of one Faculty member who heard recently from a colleague at another University that A. Hirschman was being considered for an Institute appointment.

7. Last but not least, we have heard Dr. Kaysen tell us that he had asked A. Hirschman for permission to nominate him for an appointment. I hope I was not the only Faculty member to be struck by the impropriety of this procedure.

We belong to the academic world, where the matter of confidentiality is usually well understood. On the other hand, in the Washington world, leaks are regarded as a method of government. A recent newspaper story quoted an ambassador as having told his staff, on taking charge of his embassy: "Leaks are the ambassador's privilege".

Sincerely yours,



A. Weil

Professors Cherniss, Clagett, Elliott, Gilbert, Gilliam, Habicht, Kennan,  
Lavin, Meiss, Setton, Thompson, White  
Borel, Gödel, Harish-Chandra, Langlands, Milnor, Montgomery  
Selberg, Whitney  
Adler, Bahcall, Dashen, Dyson, Regge, Rosenbluth  
Geertz

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

THE DIRECTOR

November 3, 1972

Dear Cliff:

Maybe we will earn a Legion of Honor  
too. Please return.

Cordially,



Carl Kaysen

Professor Clifford Geertz

W 303

*Now if we could just convince him  
that it is fashionable in some circles  
to dismiss sociology as irrelevant...*



November 3, 1972

Dear André:

Thank you very much for your note. It is agreeable as well as reassuring to have your kind words.

Cordially,

Carl Kaysen

Professor André Weil  
School of Mathematics

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

November 3, 1972

Dr. Carl Kaysen  
Fuld Hall

Dear Carl:

I had no question to ask concerning the proposed permanent appointments to the historical school. But I hope it may not be regarded as presumptuous on my part if I wish to congratulate our colleagues on three excellent nominations. All three seem worthy of our best traditions; but I should like to express particular pleasure at seeing classical scholarship so well represented among them in the person of Professor Habicht. Such an appointment, in a field which it is fashionable in some circles to dismiss as irrelevant, does promise well for the future of the Institute.

Sincerely,



A. Weil

AW:MMM

cc: Morton White

INSTITUTE FOR ADVANCED STUDY

Professor André Weil will give a series of lectures  
on THE EXPLICIT FORMULAS OF NUMBER THEORY on  
Fridays from 3:00 to 5:00 p.m. in Fuld Hall Lecture  
Room 119 starting October 1, 1971.

October 8, 1971

Dear Bea:

Professor Weil has a seminar on Friday afternoons with a break at 4:00 p.m. He wondered whether it would be possible to have tea available for the 15-20 people who attend in this building rather than in the cafeteria. I explained there were many physical and mechanical difficulties that seemed insurmountable to me, but I thought I should extend the courtesy of inquiring whether you agreed with this. If there is a possibility that the Tea Room will be ready by November 1, that seems sufficient answer; if not, you can estimate the degree of the problem and let me know. Thanks!

*Telephoned Prof. Weil 10-12-71 to say  
Tea Room should be able to function by Oct. 22.*

October 5, 1971

Dear Professor Weil:

I understand from Miss Wakeham that you wished to have another copy of the Minutes of the April 1 Faculty Meeting, to which are attached the documents that were before the Faculty at that time. As you see, the "Current Practices" are included.

Sincerely,

Mrs. Paul Bortell, Jr.

Professor André Weil  
Institute for Advanced Study

Attachments as indicated

*See Trustees - Straus*

*Donald*  
Memorandum from

DONALD B. STRAUS

November 20, 1970

To: Dr. Carl Kayesen

Dear Carl:

Here is a suggested answer that I have prepared for Professor Weil. I have purposely left it undated and won't send it until I get some reactions to it. In your view would this reply help or hinder relations with Dr. Weil?

*DS*

*yes  
see telephone*

DONALD B. STRAUS

Professor A. Weil  
School of Mathematics  
The Institute for Advanced Study  
Princeton, New Jersey 08540

Dear Dr. Weil:

I can of course give no answer to the question you pose in your letter of November 16, 1970 that would satisfy you. I can only attempt an explanation, and this I am happy to do, because the question you pose has often concerned me as well.

The large network of nonprofit corporations in the United States is one of the features that distinguishes us from practically every other major nation of the world. In some ways, I believe, it may be that this vast structure of citizen participation in the affairs of our nation may be a more important distinguishing feature than is our method of government or our economic system. As you know, it is characteristic that our nonprofit corporations, which number among them our universities and private research organizations, have boards of directors selected from interested citizens. Since one of the obligations of such boards is to maintain the financial viability of the organization, more often than not the board members are selected from the "economic" establishment" of our country. For this reason, among others, the members of the board are often "incompetent in the fields of science and scholarship" even though they have, according to the by-laws of the organization, "the final word". In practice, however, such individuals usually have the sophistication and integrity to recognize their respective fields of incompetency and to weigh the opinions of those who are

Professor A. Weil

-2-

competent before taking action.

Notwithstanding some obvious defects, I happen to believe that the nonprofit activities of this country are the best hope we have of providing flexibility and accommodation to the rapid changes through which our society is going. This is not an automatic safeguard, and those who occupy positions of responsibility in such organizations -- professionals, administrators, and board members alike -- have a heavy responsibility to make these organizations perform effectively. One of the responsibilities is to maintain good communications between the competent experts in the field (the professionals) and those who are generalists but with the ultimate authority (the board members). This is one reason <sup>why</sup> I so wholeheartedly endorse Dr. Kaysen's program for improving communications between the faculty and the board at the Institute, and why I look forward to our meeting on January 25th.

Sincerely,

Donald B. Straus

DBS:mt

bcc: Dr. Carl Kaysen  
Mr. J. Richardson Dilworth

February 19, 1970

Dear André:

I am glad to be able to tell you that we can make available 70 Einstein Drive to your daughter and her family for the next few months. The apartment has been plastered and made ready for occupancy at any time. It will be available until the usual changeover period which occurs this year on August 24. The rent is \$130 per month.

Cordially,

Carl Kaysen

Professor André Weil  
Institute for Advanced Study

cc: Mrs. Barnett

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY

OFFICE OF THE GENERAL MANAGER

February 19, 1970

TO: Dr. Carl Kaysen  
FROM: Mrs. R. W. Barnett

Dear Dr. Kaysen:

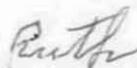
In answer to your memo of February 16th, I submit the following :

- 70 Einstein Drive -- being plastered. *2 bedrooms.*
- 78 Einstein Drive -- two bedrooms available.
- 97 Einstein Drive -- two bedrooms available.
- 98 Einstein Drive -- two bedrooms (Professor Rosenbluth has asked me to hold this for a physicist from Russia).
- 90 Einstein Drive -- (old unit) presently occupied by Sullivan.
- 91 Einstein Drive -- Nachbin (old unit).
- 130 South Olden Lane -- Bachelor unit.

Members expected with dates: (Guests)

Bertilli - 3/18 to 23  
Gauthier - 3/12 to 22  
Thomas - 3/12 to 22  
Mehta - 2/27  
Sullivan - ?  
Nachbin - Month of February  
Hirzebruch - 3/5 to 24  
Langland - 3/23 for one week.

Sincerely,



(Mrs.) Ruth W. Barnett

February 16, 1970

Memorandum for Mrs. Barnett

Professor Weil has asked me about the possible availability of an apartment for a few months for his daughter's son-in-law and grandchildren. Would you please let me know in the next few days whether we have something available that can be used without making it impossible for us to house visitors now scheduled to come; also, whether if there is something available, it is the only remaining free space under our control so that unexpected visitors could no longer be put up in the Project.

Carl Kaysen

Mrs. Ruth Barnett  
Institute for Advanced Study

EXTRACT FROM THE MINUTES OF THE MATH FACULTY HELD ON FEBRUARY 23, 1970

Professor Weil notified the School that he would take a sabbatical leave during the second term of the academic year 1970-1971.

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

Feb. 20.

Dear Carl,

Many, many thanks.

Cordially

A Weil

P.S. Long live the pulsar!

JAN 14

1970

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

(Mrs.) SYLVIE L. SAYRE  
born Fountain Hill, Pa.  
Sept. 12, 1942

(Mrs.) NICOLETTE E. SCHWARTZMAN  
born São Paulo, Brazil  
Dec. 6, 1946

PROF. WEIL'S CHILDREN

CROSS REFERENCE

**FILE:** Weil, André (Faculty)

**RE:** Leave of Absence

**LETTER DATED:** 2-6-70

**SEE:** IAS Files - Faculty--Leaves of Absence

INSTITUTE FOR ADVANCED STUDY

Professor André Weil's lectures on ZETA-FUNCTIONS  
AND MELLIN TRANSFORMS will continue on Fridays  
from 3:00 to 5:00 p.m. in Fuld Hall Lecture Room 119  
starting January 9, 1970.

*Cancelled  
1/26/70*

INSTITUTE FOR ADVANCED STUDY

Professor André Weil will give a series of lectures  
on ZETA-FUNCTIONS AND MELLIN TRANSFORMS Fridays,  
3:00 to 5:00 p.m. in Fuld Hall Lecture Room 119  
starting October 3, 1969.

This letter written by Andre Weil is included  
and was sent to Montgomery after he objected to Kaysen.  
because Jack Marcus was keeping a lot of baby Pheasants in the cellar  
under Deane's office, THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

Weil 31  
+

A. Weil

Kaysen

July 16, 1969.

SCHOOL OF MATHEMATICS

Professor Deane Montgomery  
Institute for Advanced Study  
Princeton, N.J. 08540

Dear Deane:

It is my understanding that Fuld Hall is being converted into a Pheasant Breeding Farm, and that, for what must appear to everyone as narrowly selfish motives, you have raised objections against this excellent plan.

Had you canvassed your colleagues first (as was your obvious duty), you would have discovered that there is widespread and enthusiastic agreement in favor of the aforesaid project - it being understood, of course, that a bonus of a brace or two of those valuable birds would be distributed at Christmas, Thanksgiving and other suitable occasions, to all members of our Faculty. This would go a long way towards dissipating any lingering doubts in the minds of John Milnor and other distinguished scholars and scientists, who, for unaccountable reasons, still hesitate about joining the Institute.

I should be obliged if you would formally communicate these views of mine to all those who are in any way concerned with or interested in the Pheasant Project (first and foremost, of course, our Director).

Yours sincerely



A. Weil, S.O.B.

January 15, 1969

Dear André:

Thanks for your letter of January 15.  
I don't know what you are talking about.

Sincerely yours,

Carl Kaysen

Professor André Weil  
Institute for Advanced Study

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

Jan. 15, 1969.

Dear Carl:

From Atiyah's letter of appointment, it looks as if the duties of professors at the Institute had shrunk lately. If so, it would be interesting to know when and how this happened, and why we were not told about it.

Cordially

A handwritten signature in cursive script, appearing to read 'A. Weil', written in dark ink.

A. Weil

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

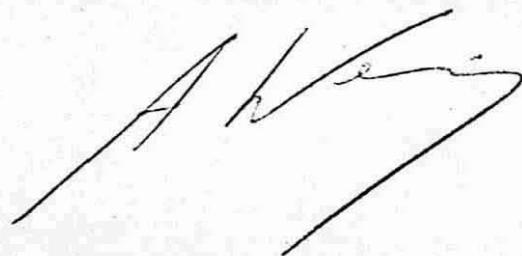
SCHOOL OF MATHEMATICS

Jan. 9, 1969

Dear Carl:

I think you are our LBJ  
I think the Social Science program is  
our Vietnam.

Cordially



# THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

Telephone-609-924-4400

THE DIRECTOR

## Memorandum for the Record

Conversation with Professor Weil in the Director's Office  
March 22, 1968 at 10:30 a.m.

Professor Weil told me that he had been invited to give the Enrico Fermi Lecture at the Scuole Normale in Pisa next year. These lectures alternate between mathematics and physics, and this year's lecturer was T.D. Lee. From the point of view of his next year's plans, Weil's best time to give the lecture would be at the end of the first term. Accordingly, we agreed that he would be on leave for the last month of the first term. The Mathematics Faculty is aware of the arrangement.

  
C.K.

CROSS REFERENCE

FILE: Weil, André

RE: Appointment of Kenneth Setton to Faculty of Historical Studies

LETTER DATED:

SEE: Setton, Kenneth (IAS Faculty)

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540  
MATHEMATICS - NATURAL SCIENCES LIBRARY

SCHOOL OF MATHEMATICS

November 1967.

Bibliography of André Weil, 1940-present.

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Weil -2-

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Weil -3-

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Weil -4-

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Weil -5-

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{Source: Mathematical Reviews 1940-present.}

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

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SCHOOL OF MATHEMATICS

November 1967.

Bibliography of André Weil, 1940-present.

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[Source: Zentralblatt für Mathematik und ihre Grenzgebiete, 1940-present.

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

November 9, 1967

Dr. Carl Kaysen  
Fuld Hall

Dear Carl:

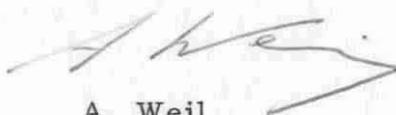
1. You have compressed the expression of my views at the recent Faculty meeting into such a small compass that some of the things I said seem to have fallen out. I am rather sure that I definitely expressed opposition to the idea of a fourth School, stating that in my opinion this will be detrimental to the Institute (or words to that effect). For the record, I should like this to be in the Minutes.

2. After seeing the plans and drawings for the proposed so-called "academic building," I find that I dislike the whole idea (and the idea of my name being used for the furtherance of this scheme) even more than before; I should like to know whether your application to the N. S. F. will mention that Faculty approval for the project has not been sought, and Faculty opinion is far from unanimous on the subject. If not, I might find it necessary to let them know about it.

3. On the merits of voting under the existing system of administration, I should also have referred you to Veblen, who indeed has some interesting comments on the concept of "advice and consent" under that system.

4. Thanks again for the Kaysen report; having looked at it briefly, I agree that it is, in every sense of the word, a report for statisticians, but I am not altogether convinced that it is otherwise harmless. As my facilities for storage of such material, both hardware (i. e., filing cabinets) and software (i. e., my own brains) are strictly limited, I am passing it on to our Secretary.

Sincerely yours,



A. Weil

AW:MMM

cc: D. Montgomery

November 2, 1967

Dear André:

Here is the notorious Kaysen Report. It is a dull document, fit only for statisticians and the like to read, but since you did me the honor to refer to it at the faculty meeting, I thought you might like a copy.

Sincerely,

Professor André Weil  
Institute for Advanced Study

Enclosure

October 31, 1967

Dear André:

Could you please supply me with an up-to-date bibliography. This is necessary in connection with my application to the NSF for money for the new building. Completion of the application now awaits the receipt of this information.

Sincerely,

Carl Kaysen

Professor André Weil  
School of Mathematics  
Institute for Advanced Study

June 2, 1967

Memorandum for the File

Re The National Medal of Science

Marston Morse, in a visit to the Director's Office on June 1, suggested Albert's letter makes perfectly clear that Weil could not succeed as a candidate. His guess was that Albert has already decided to push somebody, probably Saunders MacLane. Morse suggests that Hassler Whitney be nominated next year and that Milnor and Raoul Bott are good persons to be recommended next year.

Carl Kaysen

May 30, 1967

Dear Marston:

Attached are copies of my correspondence with Albert. I am somewhat perplexed as to his attitude; do you think it will be shared by other members of the profession?

Here is a copy of the appointment letter to Blanton. It is fortunate that he is a Jesuit, as the only housing we are not short on at the moment is bachelor flats.

It would be helpful for planning on budget and housing if it were possible for you to choose an assistant earlier in the year, say by the beginning of April.

Cordially,

Carl Kaysen

Professor Marston Morse  
School of Mathematics

May 30, 1967

Dean A. A. Albert  
The Division of Physical Sciences  
The University of Chicago  
Chicago 37, Illinois

Dear Dean Albert:

I am sorry to find that your views on Weil's national sentiments preclude your supporting him for the Medal of Science. However, I appreciate the candor of your answer, which will be helpful to me in deciding whether to pursue the matter further.

Sincerely yours,

Carl Kaysen

THE UNIVERSITY OF CHICAGO  
CHICAGO 37 • ILLINOIS  
THE DIVISION OF THE PHYSICAL SCIENCES

*Office of the Dean*

May 16, 1967

Dr. Carl Kaysen, Director  
The Institute for Advanced Study  
Princeton, New Jersey

Dear Dr. Kaysen:

I feel that the nomination of Andre Weil as a candidate for the National Medal of Science would be highly inappropriate. There is no doubt of his distinction as a mathematician, but there are others who are also very distinguished and who have also served this country for many years and in many ways.

In particular, Andre has never, to my knowledge, made any attempt to become a citizen, and I regard this as conclusive evidence that he is completely French and should not be a serious candidate for the National Medal of Science of this country.

Sincerely yours,

*Adrian Albert*

A. A. Albert, Dean

May 10, 1967

Professor Adrian A. Albert  
Department of Mathematics  
University of Chicago  
Chicago, Illinois

Dear Professor Albert:

In response to an invitation from the President's Committee on the National Medal of Science, I am proposing to nominate Professor Andre Weil for the Medal.

I write to you, at the suggestion of Marston Morse, to ask whether you would be willing to join him in supporting the nomination and whether you could suggest some other distinguished mathematician outside Princeton who might also be willing to do so.

Excuse my troubling you in this matter, but I think Weil's eminence justifies the trouble.

Sincerely yours,

Carl Kaysen  
Director

Dear Professor Weil,

While trying to formulate clearly the question I was asking you before Chern's talk I was led to two more general questions. Your opinion of these questions would be appreciated. I have not had a chance to think over these questions seriously and I would not ask them except as the continuation of a casual conversation. I hope you will treat them with the tolerance they require at this stage. After I have asked them I will comment briefly on their genesis.

It will take a little discussion but I want to define some Euler products which I will call Artin-Hecke L-series because the Artin L-series, the L-series with Grossencharaktere, and the series introduced by Hecke into the theory of automorphic forms are all special cases of these series. The first question will be of course whether or not these series define meromorphic functions with functional equations. I will say a few words about the functional equation later. The other question I will formulate later. It is a generalization of the question of whether or not abelian L-series are L-series with Grössencharaktere. Since I want to formulate the question for automorphic forms on any reductive group I have to assume that certain results in the reduction theory can be pushed a little further than they have been so far.

Unfortunately I must be rather pedantic. Let  $k$  be the rational field or a completion of it. Let  $G$  be a product of simple groups, perhaps abelian, split over  $k$ . Suppose the non-abelian factors are simply connected. The case that the product is empty and  $G = \{1\}$  is not without interest. Fix a split Cartan subgroup  $\tilde{T}$  and let  $\tilde{L}$  be the lattice of weights of  $\tilde{T}$ .  $\tilde{L}$  contains the roots. I want to define "the" conjugate lattice to  $\tilde{L}$ . It is enough to do this for a simple group for we can then take direct products and direct sums. If  $G$  is abelian and simple let  $\tilde{L}'$  be any sublattice of  $\tilde{L}$  and  ${}^c\tilde{L}$ , the conjugate lattice, be the dual of  $\tilde{L}'$  (i.e.  $\text{Hom}(\tilde{L}', \mathbb{Z})$ ). It contains  ${}^c\tilde{L}$ , the dual of  $\tilde{L}$ . Let  ${}^cG$  be a one-dimensional split torus whose lattice of weights is identified with  ${}^c\tilde{L}$ . If  $G$  is simple and non-abelian let  $\tilde{L}$  be the lattice generated by the roots and let  ${}^c\tilde{L}$  be the dual of  $\tilde{L}$ .  ${}^c\tilde{L}$  contains  ${}^c\tilde{L}$  the dual of  $\tilde{L}$ . Choose for each root  $\alpha$  an element  $u_\alpha$  in the Cartan subalgebra corresponding to  $\tilde{T}$  in the usual way so that  $\alpha(u_\alpha) = 2$ . The linear functions  ${}^c\alpha(\lambda) = \lambda(u_\alpha)$  generate  ${}^c\tilde{L}$ . There is a unique simply connected group  ${}^cG$  whose lattice of weights is isomorphic to  ${}^c\tilde{L}$  in such a way that the roots of  ${}^cG$  correspond to the elements  ${}^c\alpha$ . Fix simple roots  $\alpha_1, \dots, \alpha_r$  of  $G$ ; then  ${}^c\alpha_1, \dots, {}^c\alpha_r$  can be taken as the simple roots of  ${}^cG$ . Now return to the general case.

If  $L$  is a lattice lying between  $\tilde{L}$  and  ${}^c\tilde{L}$  we can associate to  $L$  in a natural way a group  $G$  covered by  ${}^cG$ . The dual lattice  ${}^cL$  of  $L$  lies between  ${}^c\tilde{L}$  and  $\tilde{L}$ . It determines a group  ${}^cG$ , covered by  ${}^cG$ , which I call the conjugate of  $G$ . Let  $\mathfrak{h}$  be the Lie algebra of  $\tilde{T}$  and choose for each root  $\alpha$  a root vector  $X_\alpha$  so that the conditions of Chevalley are satisfied. Also let  ${}^c\mathfrak{h}$  be a split Cartan subalgebra of  ${}^c\mathfrak{g}$  for each root  $\alpha$  choose a root vector  ${}^cX_\alpha$  so that the conditions of Chevalley are satisfied. Let  $\Omega$  be the group of automorphisms of  $\mathfrak{g}$  which take  $\mathfrak{h}$  to itself, permute  $\{X_\alpha \mid \alpha \text{ simple}\}$ , and take  $\tilde{L}, {}^c\tilde{L}, L$  to themselves. Define  ${}^c\Omega$  in a similar fashion.  ${}^c\Omega$  is the contragredient of  $\Omega$  so that  $\Omega$  and  ${}^c\Omega$  are canonically isomorphic.  $\Omega$  thus acts

1) group to  ${}^cG$  and "the" conjugate

as a group of automorphisms of  $G$  and of  ${}^c G$ . If  $K$  is a finite Galois extension of  $k$  and  $\delta$  is a homomorphism of  $G_f = G_f(K/k)$  into  $\Omega$  with image  $\Omega_f$  let  $G_f^\delta$  and  ${}^c G_f^\delta$  be the associated forms of  $G$  and  ${}^c G$  in  $\Omega_f$ .

In order to define the local factors of the L-series I have to recall some facts about the Hecke algebra of  $G_f^\delta$  when  $K$  is an unramified extension of the p-adic field  $k$ . If we choose a maximal compact subgroup of  $G_f$  in a suitable manner then, according to Bruhat and Satake, the Hecke algebra is isomorphic to the set of elements in the group algebra of  $G_f^\delta$ , the set of elements in  ${}^c G_f^\delta$  fixed by  $\Omega_f^\delta$ , which are invariant under the restricted Weyl group  ${}^c W_f^\delta$  of  ${}^c G_f^\delta$ . (Actually we have to stretch their results a little). Thus any homomorphism  $\chi$  of the Hecke algebra into the complex numbers can be extended to a homomorphism  $\chi'$  of the group algebra of  ${}^c G_f^\delta$  into the complex numbers. There is at least one element  $g$  of  ${}^c T_f^\delta$  so that if  $f = \sum_{\lambda \in {}^c L_f^\delta} a_\lambda \chi_\lambda$  ( $\chi_\lambda$  is  $\lambda$  written multiplicatively) then  $\chi'(f) = \sum a_\lambda \chi_\lambda(g)$ . The semi-direct product  $G_f^\delta \rtimes {}^c W_f^\delta$  is a complex group. Let  $\pi$  be a complex representation of it. If  $\sigma$  is the Frobenius then

$$\frac{1}{\det(1 - x\pi(\sigma \times g))} \quad (x \text{ an indeterminate})$$

is the local zeta function corresponding to  $\chi$  and  $\pi$ . I have to verify that it depends only on  $\chi$  and not on  $g$ . If  $\lambda$  is any weight let  $n_\lambda$  be the lowest power of  $\sigma$  which fixed  $\lambda$  and if  $n_\lambda | n$  and  $\pi$  acts on  $V$  let  $t_\lambda(n)$  be the trace of  $\sigma^n$  on

$$\{v \in V \mid \pi(h)v = \chi_\lambda(h)v \text{ for all } h \in {}^c T_f^\delta\}$$

Then

$$\begin{aligned} \log \frac{1}{\det(1 - x\pi(\sigma \times g))} &= \sum_{n=0}^{\infty} \frac{x^n}{n} \sum_{\lambda \in L} \sum_{n_\lambda | n} t_\lambda(n) \chi_\lambda(g^{\sigma^{n-1}} g^{\sigma^{n-2}} \dots g) \\ &= \sum_{n=0}^{\infty} \frac{x^n}{n} \sum_{\lambda \in L} \sum_{n_\lambda | n} t_\lambda(n) E_{\frac{n}{n_\lambda}} \left( \sum_{k=0}^{n_\lambda-1} \lambda^{\sigma^k} \right) (g) \end{aligned}$$

Moreover if  $\omega$  is an element of  ${}^c W_f^\delta$  we can always choose a representation  $\omega$  of it which commutes with  $\sigma$ . Then the local zeta function does not change if  $g$  is replaced by  $\omega^{-1} g \omega$  so it equals

$$\frac{1}{[{}^c W_f^\delta : 1]} \sum_{n=0}^{\infty} \frac{x^n}{n} \sum_{\lambda} \sum_{n_\lambda | n} t_\lambda(n) \sum_{\omega \in {}^c W_f^\delta} E_{\frac{n}{n_\lambda}} \left( \sum_{k=0}^{n_\lambda-1} \lambda^{\sigma^k} \right) \omega(g)$$

Since

$$\sum_{\omega} E_{\frac{n}{n_\lambda}} \left( \sum_{k=0}^{n_\lambda-1} \lambda^{\sigma^k} \right) \omega$$

belongs to the image of the Hecke algebra the assertion is verified.

I don't know if it is legitimate but let us assume that the characters of the complex representations separate the semi-simple conjugacy classes

in  $\mathfrak{g} \times \mathfrak{r} \subset \mathfrak{G}$ . Then by the above I can associate to each homomorphism  $\chi$  of the Hecke algebra into the complex numbers the conjugacy class of the semi-simple element  $\sigma \times \mathfrak{g}$ . Conversely given a semi-simple conjugacy class in  $\mathfrak{g} \times \mathfrak{r} \subset \mathfrak{G}$  it contains, by Borel-Mostow, an element in the normalizer of  ${}^c\Gamma$ . Then it even contains an element which takes positive roots into positive roots. Thus if the projection of the conjugacy class on  $\mathfrak{g}$  (an abelian group) is  $\sigma$  the conjugacy class contains an element of the form  $\sigma \times \mathfrak{g}, g \in \Gamma$ . As above  $\mathfrak{g}$  determines a homomorphism of the Hecke algebra into the complex numbers. If this homomorphism  $\chi$  is completely determined by the local zeta factors attached to it then it is completely determined by the conjugacy class of  $\sigma \times \mathfrak{g}$  and we have one-to-one correspondence between homomorphisms of the Hecke algebra into the complex numbers and semi-simple conjugacy classes in  $\mathfrak{g} \times \mathfrak{r} \subset \mathfrak{G}$  whose projection on  $\mathfrak{g}$  is  $\sigma$ . It is enough to check that the value of  $\chi$  on an element of the form  $\sum_{w \in {}^cW} \zeta(\sum_{\alpha \in \Delta} \lambda \cdot \alpha)$  where  $\sum_{\alpha \in \Delta} \lambda \cdot \alpha$  belongs to the positive Weyl chamber, is determined by the local zeta functions. This can be done by the usual sort of induction for  $\sum \lambda \cdot \alpha$  is invariant under  $\mathfrak{G}$  and thus the highest weight of a representation of  $\mathfrak{g} \times \mathfrak{r} \subset \mathfrak{G}$  whose restriction to  ${}^c\mathfrak{G}$  is irreducible.

Now I am going to try to define the Artin-Hecke L-series. To do this let us fix for each  $p$  an imbedding of  $\overline{\mathbb{Q}}$ , the algebraic closure of  $\mathbb{Q}$ , in  $\mathbb{Q}_p$ . We will have to come back later and check that the series are independent of these choices. The choice will be implicit in the next paragraph.

Suppose we have a twisted form  $\overline{G}$  of  $G$  over the rationals. The twisting can be accomplished in two steps. First for a suitable Galois extension  $K$  of  $\mathbb{Q}$  take a homomorphism  $\mathfrak{r}$  of  $\mathfrak{g} = \mathfrak{g}(K/\mathbb{Q})$  into  $\Omega$  to obtain  $G^{\mathfrak{r}}$ . Then take an inner twisting of  $G^{\mathfrak{r}}$  by means of the cocycle  $\{a_{\alpha}\} \in \mathfrak{g}$ . Let me assume the truth of the following:

- (I) Suppose  $G$  is a linear group acting on  $V$ . Let  $L$  be a Chevalley lattice in  $V_{\mathbb{Q}}$ . Then the intersection  $G_{\mathbb{Z}_p}$  of  $G_{\mathbb{Q}_p}$  with the stabilizer of  $L \otimes_{\mathbb{Z}} \overline{\mathbb{Z}}_p$  ( $\overline{\mathbb{Z}}_p$  is the ring of integers in  $\overline{\mathbb{Q}}_p$ ) is, for almost all  $p$ , one of the maximal compact subgroups referred to above.
- (II) For almost all  $p$  the restriction of  $\{a_{\alpha}\}$  to  $\mathfrak{g}(K_{\mathbb{Q}_p}/\mathbb{Q}_p) = \mathfrak{g}(K_p/\mathbb{Q}_p) = \mathfrak{g}$  splits. Moreover for such  $p$  there is a  $b$  in the intersection of  $G_{K_p}$  with the stabilizer of  $L \otimes_{\mathbb{Z}} \overline{\mathbb{Z}}_p$  so that  $a_{\sigma} = b^{\sigma} b^{-1}$ ,  $\sigma \in \mathfrak{g}_p$ .

Now take a  $p$  satisfying (I) and (II) which does not ramify in  $K$ . Since  $\overline{G}_{\mathbb{Q}_p} = \{g \in G_{K_p} \mid g^{\sigma} a_{\sigma} = g, \sigma \in \mathfrak{g}_p\}$  the map  $g \rightarrow g^b$  is an isomorphism of  $\overline{G}_{\mathbb{Q}_p}$  with  $G_{\mathbb{Q}_p}$ . Moreover we can take  $\overline{G}_{\mathbb{Z}_p}$  to be the intersection of  $\overline{G}_{\mathbb{Q}_p}$  with the stabilizer of  $L \otimes_{\mathbb{Z}} \overline{\mathbb{Z}}_p$  so the map takes  $\overline{G}_{\mathbb{Z}_p}$  to  $G_{\mathbb{Z}_p}$ . The induced isomorphism of the Hecke algebras is independent of the choice of  $b$ . Now  $G_A = \prod G_{\mathbb{Q}_p}$ . Suppose we have an automorphic form  $\phi$  on  $G_{\mathbb{Q}} \backslash G_A$  which is an eigen function of the Hecke algebras for almost all  $p$ . Then, for almost all  $p$ , we have a homomorphism of the Hecke algebra into the complex numbers and thus a semi-simple conjugacy class  $\mathfrak{d}_p$  in  $\mathfrak{g}_p \times \mathfrak{r} \subset \mathfrak{G} \subset \mathfrak{g} \times \mathfrak{r} \subset \mathfrak{G}$ . If  $\pi$  is a complex representation of  $\mathfrak{g} \times \mathfrak{r} \subset \mathfrak{G}$  I define the Artin-Hecke L-series as

$$L(s, \pi, \phi) = \prod_p \frac{1}{\det(1 - \pi(\mathfrak{d}_p) p^{-s})} \quad (\text{Product is taken over almost all } p)$$

I have to check that these series are independent of the imbeddings

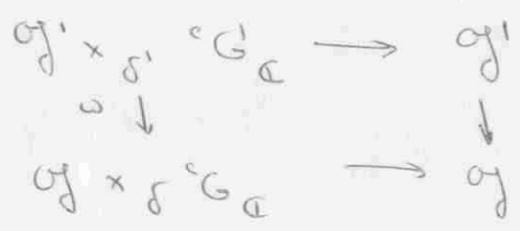
1. This is probably true and the materials for a proof are probably available in the literature. However it is not so obvious as I thought when writing the letter.



The first question is whether or not these products define functions meromorphic in the entire complex plane with poles of the usual type and whether or not for each  $\phi$  there is an automorphic form  $\psi$  so that  $L(s, \phi, \pi) / L(s, \psi, \tilde{\pi})$  is an elementary function for all  $\pi$ .  $\tilde{\pi}$  is the representation contragradient to  $\pi$ .

Before I go into the second question let me just say that I have been making some experiments with Eisenstein series and, although the work is far from completed, it looks as though I will get some series of the above type which because of their relation to the Eisenstein series will be meromorphic in the whole plane. ~~The definitions above~~ It might even be possible to get a functional equation in a smaller number of cases from the functional equations of the Eisenstein series. The definitions above are the result of trying to find some class of Euler products which will contain the ones coming from the Eisenstein series but which is not restricted in any artificial fashion.

Now if  $G = GL(n)$ , ~~and~~ <sup>the</sup> action of  $\sigma_f$  is trivial, and  $\pi$  is the representation  $g \rightarrow \pi(g)$  one can perhaps use the ideas of Tamagawa to handle the above series. This leads to the second question. Suppose we have  $K, G, \sigma$  as above and also  $K', G', \sigma'$ . If  $K < K'$  we have a homomorphism  $\sigma' \rightarrow \sigma$ . Suppose moreover that  $\omega$  is a homomorphism of  $\sigma' \times \delta' \times G'$  into  $\sigma \times \delta \times G$  so that the following diagram is commutative



If  $\phi'$  is an automorphic form for some inner form of  $G'^{\delta'}$  satisfying the condition we had above then for almost all  $p$ ,  $\phi'$  defines a conjugacy class  $\alpha'_p$  in  $\sigma' \times \delta' \times G'$ . Let  $\alpha_p$  be the image of  $\alpha'_p$  in  $\sigma \times \delta \times G$ . The second question is the following. Is there an automorphic form  $\phi$  associated to some inner form of  $G^\delta$  such that for almost all  $p$  the conjugacy class associated to it is  $\alpha_p$ .

Let me give some idea of what an affirmative answer to the question entails.

(I) Take  $\sigma' = \sigma$  and let  $G'$  be a split torus of rank  $l$  equal to the rational rank of  $G^\delta$  on which  $\sigma'$  acts trivially. Let  $A$  be a maximal split torus of  $G^\delta$ . Since  $\sigma$  acts trivially on  $A$ ,  $\sigma \times \delta \times G \simeq \sigma \times A \times G^\delta$ . Since there are  $l$  parameter families of Automorphic forms on  $G^\delta$ , an affirmative answer implies the same is true for some inner form of  $G^\delta$ . But this we know from the theory of Eisenstein series.

(II) Let  $\sigma' = \sigma$  and let  $G' = \{1\}$ . Map  $\sigma' \times \delta' \times G'$  to  $\sigma \times \{1\} \times G^\delta \simeq \sigma \times \delta \times G$ . In this case it should be possible to give an affirmative answer to the question by taking  $\phi$  to be the automorphic form obtained by setting the parameter equal to zero in a suitable Eisenstein series.  $\phi'$  is of course constant.

(III) Now let me say a few words about the relation of the question to the Artin reciprocity law. For the rational field take  $\sigma'$  abelian  $G' = \{1\}$  and let  $\chi$  be a character of  $\sigma'$ . Let  $\sigma = \sigma'$  and let  $G$  be a one-dimensional split torus in which  $\sigma$  acts trivially. Let  $\omega$  take

1. It appears that it will be possible to take  $\psi = \phi$ .

$\tau \times 1$  to  $\tau \times \chi(\tau)$ . Then an affirmative answer is just the Artin reciprocity law for cyclic extensions of the rationals. Now suppose we have the following situation



$K/\mathbb{Q}$  is Galois and  $K_1'/K_1$  is abelian. Let  $\mathcal{G} = \mathcal{G}(K/\mathbb{Q})$ , let  $\mathcal{G}_1$  be the elements of  $\mathcal{G}$  which fix  $K_1$  and let  $\mathcal{G}_1'$  be the elements of  $\mathcal{G}$  which fix  $K_1'$ . Finally suppose  $\chi$  is a character of  $\mathcal{G}(K_1'/K_1) = \mathcal{G}_1'/\mathcal{G}_1$  and thus of  $\mathcal{G}_1/\mathcal{G}_1$ . I will take  $\mathcal{G}' = \mathcal{G}$  and  $G' = K_1'$ . Let  $\mathcal{L} = \{\mathcal{G}_1, \mathcal{G}_1'\}$  and let  $\mathcal{G} = \cup_{i=1}^{\ell} \mathcal{G}_1' \tau_i$ ; with  $\tau_i \in \mathcal{G}_1$ . Let  $i_\sigma$  be such that  $\tau_i \sigma \in \mathcal{G}_1' \tau_{i_\sigma}$ . Let  $G$  be the direct product  $T_1 \times \dots \times T_\ell$  of  $\ell$  one-dimensional split tori. Define  $\delta$  by  $(t_1, \dots, t_\ell)^{\delta(\sigma)} = t_1^{\sigma_{i_1}} \dots t_\ell^{\sigma_{i_\ell}}$ . It is easy to check that  $\delta(\sigma\tau) = \delta(\sigma)\tau$ . Moreover  $G'$  is just the multiplicative group of  $K_1'$ . Also  ${}^c G = G$ . Define  $f_i(\sigma)$  by  $\tau_i \sigma^{-1} = f_i^{-1}(\sigma) \tau_{i_\sigma}$ . Then

$$\tau_i \tau_i^{-1} \sigma^{-1} = f_i^{-1}(\sigma) \tau_{i_\sigma} \sigma^{-1} = f_i^{-1}(\sigma) f_{i_\sigma}(\sigma) \tau_{i_\sigma} \sigma^{-1} = f_i(\sigma) \tau_{i_\sigma} \sigma^{-1} = f_i(\sigma) \tau_{i_\sigma} \sigma^{-1}$$

Define  $\omega$  by

$$\omega(\sigma \times 1) = \sigma \times (\chi(f_1(\sigma)) \times \dots \times \chi(f_\ell(\sigma)))$$

then

$$\omega(\sigma \times 1) \omega(\tau \times 1) = \sigma \tau \times \prod_{i=1}^{\ell} \chi(f_{i_\sigma}(\sigma)) \chi(f_i(\tau)) = \omega(\sigma \tau \times 1)$$

By the way if the  $\tau_i, 1 \leq i \leq \ell$  are replaced by  $\tau_i' = \mu_i \tau_i$  with  $\mu_i \in \mathcal{G}_1$  then  $f_i'(\sigma) = \mu_{i_\sigma}^{-1} f_i(\sigma) \mu_i$ ; and

$$\omega'(\sigma \times 1) = (\chi(\mu_1) \times \dots \times \chi(\mu_\ell))^{-1} \omega(\sigma \times 1) (\chi(\mu_1) \times \dots \times \chi(\mu_\ell))$$

so the map does not depend in an essential way on the choice of coset representatives.

I will take  $\phi'$  to be a constant. By the Artin reciprocity law there is associated to  $\chi$  a character of  $K_1' \backslash \bar{K}_1$ , that is, an automorphic form  $\phi$  on  $G_{\mathbb{Q}}/G_A$ . I claim that  $\phi$  is the automorphic form which provides an affirmative answer to the question.

To show this we make use of the freedom we have in the choice of coset representatives. Let  $p$  be a prime which does not ramify in  $K$ . Fix an imbedding of  $K$  in  $\bar{\mathbb{Q}}_p$ . We identify  $K$  with its image. Let  $\mathfrak{p}_1, \dots, \mathfrak{p}_r$  be the prime divisors of  $p$  in  $K_1$ . Choose  $\mu_1, \dots, \mu_r$  in  $\mathcal{G}$  so that the map  $x \rightarrow x^{\mu_j}$  of  $K_1$  into  $\bar{\mathbb{Q}}_p$  extends to a continuous map of the completion of  $K_1$  with respect to  $\mathfrak{p}_j$  into  $\bar{\mathbb{Q}}_p$ . Let  $L_j = K_1^{\mu_j} \bar{\mathbb{Q}}_p$  and let  $n_j = [L_j : \bar{\mathbb{Q}}_p]$ . If  $\sigma_p$  is the Frobenius the automorphism  $\mu_j \sigma_p^k, 1 \leq j \leq r, 0 \leq k < n_j$  form a set of representatives for the cosets of  $\mathcal{G}_1$ . If  $\tau_i = \mu_j \sigma_p^k$  then  $f_i(\sigma_p) = 1$  unless  $k=0$  when  $f_i(\sigma_p) = \mu_j \sigma_p^{n_j} \mu_j^{-1}$ . Thus  $\omega(\sigma_p) = \alpha_p$  is the conjugacy class of

$$\sigma_p \times \prod_{j=1}^r (\chi(\mu_j \sigma_p^{n_j} \mu_j^{-1}) \times 1 \times \dots \times 1)$$

$\mu_j \sigma_p^{n_j} \mu_j^{-1}$  belongs to the Frobenius conjugacy class in  $\mathcal{G}_1$  corresponding to  $\gamma_j$ .

On the other hand  $G_{\mathbb{Q}_p} \subseteq G_A$  is the set of elements of the form  $\prod_{j=1}^r \prod_{k=0}^{n_j-1} x_j^{\sigma_p^k}$  with  $x_j$  a non-zero element in  $L_j$ . The restriction of  $\phi$  to such an element is, by its very definition,

if  $|x_j| = p^{-o(x_j)}$ . Since  ${}^c G = G$  the associated conjugacy class is the one determined by any element

$$\prod_{j=1}^r \chi(\mu_j \sigma_p^{n_j} \mu_j^{-1})^{o(x_j)}$$

$$\sigma_p \times \prod_{j=1}^r \prod_{k=0}^{n_j-1} \alpha_{jk}$$

such that

$$\prod_{j=1}^r \prod_{k=0}^{n_j-1} \alpha_{jk}^{o(x_j)} = \prod_{j=1}^r \chi(\mu_j \sigma_p^{n_j} \mu_j^{-1})^{o(x_j)}$$

Looking above we see that  $\omega(\alpha_p')$  is such an element.

(IV) Finally I want to comment on the implications an affirmative answer to the second question might have for the problem of finding a splitting law for non-abelian extensions. I had planned to discuss arbitrary ground fields but I realize now that I have to take the ground field to be  $\mathbb{Q}$ .

Let  $K$  be a Galois extension of  $\mathbb{Q}$  and let  $\mathcal{G} = \mathcal{G}(K/\mathbb{Q})$ . We want a method of finding for almost all  $p$  the Frobenius conjugacy class  $\{\sigma_p\}$  in  $\mathcal{G}$ . Thus we have to find trace  $\pi(\sigma_p)$  or the conjugacy class of  $\pi(\sigma_p)$  in  $GL(m, \mathbb{C})$ , if  $\pi: \mathcal{G} \rightarrow GL(m, \mathbb{C})$ , for all representations  $\pi$  of  $\mathcal{G}$ . Let us fix  $\pi$ . As before I will take  $\mathcal{G}' = \mathcal{G}$ ,  $G = \mathbb{Z}$ , and  $\phi'$  to be a constant function. I will take  $G = GL(m)$ . Let me check that  ${}^c G$  is also  $GL(m)$ .

Take  $\tilde{G} = {}^c \tilde{G} = A \times SL(m)$  where  $A$  is a one dimensional split torus.

Then

$${}^c \tilde{L} = \tilde{L} = \{(z, z_1, \dots, z_m) \mid z, z_i - z_j \in \mathbb{Z}, \sum_{i=1}^m z_i = 0\}$$

$${}^c L = L = \{(z, z_1, \dots, z_m) \mid z_i + \frac{z}{m} \in \mathbb{Z}, \sum_{i=1}^m z_i = 0\}$$

$${}^c \tilde{L}' = \tilde{L}' = \{(mz, z_1, z_2 - z_1, \dots, z_{n-1} - z_{n-2}, -z_{n-1}) \mid z, z_i \in \mathbb{Z}\}$$

The pairing is given by

$$\langle (z, z_1, \dots, z_m), (y, y_1, \dots, y_m) \rangle = \frac{zy}{m} + \sum_{i=1}^m z_i y_i$$

In any case  $G = {}^c G = GL(m)$ . Define  $\omega$  by

$$\omega(\sigma \times 1) = \sigma \times \pi(\sigma)$$

The action of  $\mathcal{G}$  on  $G$  is to be trivial. Since  $\omega(\alpha_p') = \alpha_p$  is the conjugacy class of  $\sigma_p \times \pi(\sigma_p)$ , which of course determines the conjugacy class of  $\pi(\sigma_p)$ . We need a method of finding the class of  $\pi(\sigma_p)$ .

Suppose there is an automorphic form  $\phi$  on some inner form of  $GL(m)$  which provides an affirmative answer to the above question. To find  $\omega_p(\pi(\sigma_p))$  all we need do is calculate the eigen values of a finite number of elements of the Hecke algebra  $H_p$  corresponding to the eigen function  $\phi$ . Choose a finite set  $S$  of primes containing the infinite prime so that if  $\tilde{G}_S = \prod_{q \in S} \tilde{G}_{\mathbb{Q}_q}$  and  $\tilde{G}_{S^c} = \prod_{q \notin S} \tilde{G}_{\mathbb{Z}_q}$  then  $\tilde{G}_A = \tilde{G}_{\mathbb{Q}} \tilde{G}_S \tilde{G}_{S^c}$ .

1) However one could presumably go back and reformulate the two questions in the context of groups over a number field. The first question is not sensitive to the choice of ground field but the second is.

and  $\phi$  is a function on  $\bar{G}_Q \setminus \bar{G}_A / \bar{G}_S$ .

Suppose  $p \notin S$  and  $f$  is the characteristic function of  $\bar{G}_{Z_p} \times \bar{G}_{Z_p}$  which is the disjoint union  $\cup_{i=1}^n a_i \bar{G}_{Z_p}$ . If  $g \in \bar{G}_S$

$$\begin{aligned} \lambda(f)\phi(g) &= \int_{\bar{G}_{Q_p}} \phi(hg) f(h) dh \\ &= \sum_{i=1}^n \phi(g a_i) = \sum_{i=1}^n \phi(a_i g) \end{aligned}$$

since  $a_i \in \bar{G}_{Q_p}$ . Choose  $\bar{a}_1, \dots, \bar{a}_n$  in  $\bar{G}_Q$  so that  $\bar{a}_i^{-1} a_i \in \bar{G}_S \bar{G}_p$  and let  $b_i$  be the projection of  $\bar{a}_i$  on  $\bar{G}_S$ . If  $\lambda(f)$  is the eigen value of  $f$

$$\chi(f)\phi(g) = \sum \phi(\bar{a}_i^{-1} a_i g) = \sum \phi(b_i^{-1} g)$$

Now roughly speaking the elements  $\bar{a}_1, \dots, \bar{a}_n$  are obtained by solving some diophantine equations involving  $p$  as a parameter. Then  $\phi(b_i^{-1} g)$  depends upon the congruential properties of  $\bar{a}_i$ ; modulo powers of the finite primes in  $S$  and the projection of  $\bar{a}_i$  on  $\bar{G}_{Q_p} = \bar{G}_p$ . If, for each  $g$  in  $\bar{G}_S$ ,  $\phi(hg)$  as a function of  $h$  in the connected component of  $\bar{G}_p$  were rational we would get a good splitting law. It would be rather complicated but in principle no worse than the splitting law of Dedekind-Hasse for the splitting field of a cubic equation. However because of the strong approximation  $\phi(hg)$  will probably not be rational unless  $m=1$  or  $2$ . Thus we could only get a transcendental splitting law.

Nonetheless if we took  $G$  to be the symplectic group in  $2n$  variables and  ${}^c G$  to be the orthogonal group in  $2n+1$  variables then strong approximation is no obstacle because  $G$  has inner forms for which  $\bar{G}_p$  is compact and we might hope to obtain laws about such things as the order of  $\sigma_p$  by considering imbeddings of  $\sigma_j$  in  ${}^c G$ .

Yours truly,

R. Langlands.

Postscript: Let me add

(V) Let  $K$  be a quadratic extension of  $\mathbb{Q}$ . Let  $\sigma_j = \sigma_j(K/\mathbb{Q})$ . Let  $G' = {}^c G' = A_1 \times A_2$  where  $A_1$  and  $A_2$  are one dimensional split tori. If  $\sigma$  is the non-trivial element of  $\sigma_j$  let  $(t_1 \times t_2)^{\sigma} = t_2 \times t_1$ . Let  $G = GL(2)$  and let  $\sigma_j$  act trivially on  $G$ . Define  $\omega$  by

$$\omega(1 \times (t_1, t_2)) = \begin{pmatrix} t_1 & 0 \\ 0 & t_2 \end{pmatrix}$$

$$\omega(\sigma \times (t_1, t_2)) = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} t_1 & 0 \\ 0 & t_2 \end{pmatrix} = \begin{pmatrix} 0 & t_2 \\ t_1 & 0 \end{pmatrix}$$

$G'_A$  is just the idele group of  $K$ . Take  $\phi'$  to be a Grössencharakter. It is not inconceivable that the work of Hecke and Maass on the relation between  $L$ -series with Grössencharaktere from a quadratic field and automorphic forms will provide an affirmative answer to the second question in this case.

PRINCETON UNIVERSITY-INSTITUTE FOR ADVANCED STUDY  
Current Literature Seminar

Speaker: Professor André Weil

Topic: NUMBER THEORY OF ELLIPTIC CURVES

Time: Wednesday, March 1, 1967, at 4:30 p.m.

Place: Fuld Hall Lecture Room 119

Professor Weil:

In response to your invitation to come and talk I wrote  
the <sup>enclosed</sup> ~~following~~ letter. After I wrote it I realized there was hardly  
a statement in it of which I was certain. If you are willing  
to read it as pure speculation I would appreciate that; if not -  
I am sure you have a waste basket handy.

Yours truly,  
R Langland

Jan. 16, '67.

Dear André,

Langlands gave it to me to have a look and then pass it on  
to you. Since I am busy right now, I am giving it to you after just  
a casual glance. I hope you will let me have it back a little later.

Yours sincerely  
Harsh

Dear Professor Weil,

While trying to formulate clearly the question I was asking you before Chern's talk I was led to two more general questions. Your opinion of these questions would be appreciated. I have not had a chance to think over these questions seriously and I would not ask them except as the continuation of a casual conversation. I hope you will treat them with the tolerance they require at this stage. After I have asked them I will comment briefly on their genesis.

It will take a little discussion but I want to define some Euler products which I will call Artin-Hecke  $L$ -series because the Artin  $L$ -series, the  $L$ -series with Größencharakter, and the series introduced by Hecke into the theory of automorphic forms are all special cases of these series. The first question will be of course whether or not these series define meromorphic functions with functional equations. I will say a few words about the functional equation later. The <sup>other</sup> next question I will formulate later. It is a generalization of the question of whether or not abelian  $L$ -series are  $L$ -series with Größencharakter. Since I want to formulate the question for automorphic forms on any reductive group I have to assume that certain results in the reduction theory can be pushed a little further than they have been so far.

Unfortunately I must be rather pedantic. Let  $k$  be the rational field or a completion of it. Let  $G$  be a product of simple groups, perhaps abelian, split over  $k$ . Suppose the non-abelian factors

not without interest. Fix a split Cartan subgroup  $\tilde{T}$  and let  $\tilde{L}$  be the lattice of weights of  $\tilde{T}$ .  $\tilde{L}$  contains the roots. I want to define the conjugate group to  $\tilde{G}$  and "the" conjugate lattice to  $\tilde{L}$ . It is enough to do this for a simple group for we can then take direct products and direct sums. If  $\tilde{G}$  is abelian and simple let  $\tilde{L}'$  be any sublattice of  $\tilde{L}$  and  ${}^c\tilde{L}$ , the conjugate lattice, be the dual of  $\tilde{L}'$  (i.e.  $\text{Hom}(\tilde{L}', \mathbb{Z})$ ).

It contains  ${}^c\tilde{L}'$ , the dual of  $\tilde{L}'$ . Let  ${}^c\tilde{G}$  be a one-dimensional split torus ~~group~~ whose lattice of weights is identified with  ${}^c\tilde{L}$ . If  $\tilde{G}$  is simple and non-abelian let  $\tilde{L}'$  be the lattice generated by the roots and let  ${}^c\tilde{L}$  be the dual of  $\tilde{L}'$ .  ${}^c\tilde{L}$  contains  ${}^c\tilde{L}'$  the dual of  $\tilde{L}$ . Choose for each root  $\alpha$  an element  $H_\alpha$  in the Cartan subalgebra corresponding to  $\tilde{T}$  in the usual way so that  $\alpha(H_\alpha) = 2$ . The linear functions  ${}^c\alpha(x) = x(H_\alpha)$  generate  ${}^c\tilde{L}'$ . There is a unique simply connected group  ${}^c\tilde{G}$  whose lattice of weights is isomorphic to  ${}^c\tilde{L}$  in such a way that the roots of  ${}^c\tilde{G}$  correspond to the elements  ${}^c\alpha$ . Fix simple roots  $\alpha_1, \dots, \alpha_r$  of  $\tilde{G}$ ; then  ${}^c\alpha_1, \dots, {}^c\alpha_r$  can be taken as the simple roots of  ${}^c\tilde{G}$ . Now return to the general case.

If  $L$  is a lattice lying between  $\tilde{L}'$  and  $\tilde{L}$  we can associate to it in a natural way a group  $G$  commuted by  $\tilde{G}$ . The dual lattice  ${}^cL$  lies between  ${}^c\tilde{L}'$  and  ${}^c\tilde{L}$ . It determines a group  ${}^cG$ , commuted by  ${}^c\tilde{G}$ , which is still the conjugate of  $G$ . Let  $\mathfrak{h}$  be the Lie algebra of  $\tilde{T}$  and choose for each root  $\alpha$  a root vector  $X_\alpha$  so that the conditions of Chevalley are satisfied. Also let  $\mathfrak{h}$  be a split Cartan subalgebra of  $\mathfrak{g}$  for for each root  $\alpha$  choose a root vector  $X_\alpha$  so that the conditions of Chevalley are satisfied. Let  $\Omega$  be the group of automorphisms of  $\mathfrak{g}$  which take  $\mathfrak{h}$  to itself, permute  $\{X_\alpha | \alpha \text{ simple}\}$ , and take  $\tilde{L}, L, \tilde{L}'$  to themselves. Define  ${}^c\Omega$  in a similar fashion.  ${}^c\Omega$  is the centralizer of  $\Omega$  so that  $\Omega$  and  ${}^c\Omega$  are canonically isomorphic. ~~If  $K$  is a finite extension  $\Omega$  thus acts as a group of~~

automorphisms of  $G$  and of  ${}^c G$ . If  $K$  is a finite Galois extension of  $k$  and  $\delta$  is a homomorphism of  $\mathfrak{g} = \mathfrak{g}(K/k)$  into  $\mathfrak{h}$  with image  $\Omega^\delta$  let  $G^\delta$  and  ${}^c G^\delta$  be the associated forms of  $G$  and  ${}^c G$ .

In order to define the local factors of the L-series I have to recall some facts about the Hecke algebra of  $G_k^\delta$  when  $K$  is an unramified extension of the p-adic field  $k$ . If we choose a maximal compact subgroup of  $G_k^\delta$  in a suitable manner then, according to Bruhat and Satake, the Hecke algebra is isomorphic to the set of elements in the group algebra of  ${}^c L^\delta$ , the set of elements in  ${}^c L$  fixed by  ${}^c \Omega^\delta$ , which are invariant under the restricted Weyl groups  ${}^c W^\delta$  of  ${}^c G^\delta$ .

(Actually we have to stretch their results a little) Thus any homomorphism  $\chi$  of the Hecke algebra into the complex numbers can be extended to a homomorphism  $\chi'$  of the group algebra of  ${}^c L$  into the complex numbers. There is at least one element  $g$  of  ${}^c T$  so that if  $f = \sum_{\lambda \in L} a_\lambda E_\lambda$  ( $E_\lambda$  is  $\lambda$  written multiplicatively) then  $\chi'(f) = \sum a_\lambda E_\lambda(g)$ .

The semi-direct product of  $\chi_\delta {}^c G$  is a complex group. Let  $\pi$  be a complex representation of it. If  $\sigma$  is the Frobenius then

$$\frac{1}{\det(1 - x\pi(\sigma \times g))} \quad (x \text{ an indeterminate})$$

corresponding to  $\chi$  and  $\pi$ . I have to verify that it depends only on  $\chi$  and not on  $g$ . If  $\lambda$  is any weight let  $n_\lambda$  be the lowest power of  $\sigma$  which fixes  $\lambda$  and if  $n_\lambda | n$  and  $\pi$  act on  $V$  let  $t_\chi(n)$  be the trace of  $\sigma^n$  on

$$\{v \in V \mid \pi(h)v = \chi_\lambda(h)v \text{ for all } h \in {}^c T\}.$$

Then

$$\begin{aligned} \log \frac{1}{\det(1 - x\pi(\sigma \times g))} &= \sum_{n=0}^{\infty} \frac{x^n}{n} \sum_{\lambda \in L} \sum_{n_\lambda | n} t_\chi(n) \chi_\lambda(g^{\sigma^{n-1}} \dots g^{\sigma^2} g) \\ &= \sum_{n=0}^{\infty} \frac{x^n}{n} \sum_{\lambda \in L} \sum_{n_\lambda | n} t_\chi(n) \chi_{\frac{n}{n_\lambda}(\sum_{k=0}^{n_\lambda-1} \lambda^k \sigma^k)}(g) \end{aligned}$$

Moreover if  $\omega$  is an element of  ${}^c W^\delta$  we can always choose a representative  $w$  of it which commutes with  $\sigma$ . Then the local zeta function does not change if  $g$  is replaced by  $w + gw$  so it equals

$$\frac{1}{[{}^c W^\delta : \mathbb{Z}]} \sum_{n=0}^{\infty} \frac{x^n}{n} \sum_{\lambda} \sum_{n_\lambda | n} t_\chi(n) \sum_{\omega \in {}^c W^\delta : \pm} \chi_{\frac{n}{n_\lambda}(\sum_{k=0}^{n_\lambda-1} \lambda^k \sigma^k)}(\omega)(g)$$

Since

$$\sum_{\omega} \chi_{\frac{n}{n_\lambda}(\sum_{k=0}^{n_\lambda-1} \lambda^k \sigma^k)}(\omega)$$

belongs to the image of the Hecke algebra ~~over~~ <sup>the</sup> assertion is verified.

I don't know if it is legitimate but I thus assume that the character of the complex representation separates the semi-simple conjugacy classes in  $g \in \mathbb{Z}_p^\times \subset \mathbb{C}$ . Thus by the above I can associate to each homomorphism  $\chi$  of the Hecke algebra into the complex numbers the conjugacy class of the semi-simple

...element of  $\mathfrak{g}$ . Conversely given a semi-simple conjugacy class in  $\mathfrak{g} \times {}^c G$  it contains, by Borl-Mostow, an element in the normalizer of  ${}^c T$ . Then it even contains an element which takes positive roots into positive roots. Thus if the projection of the conjugacy class on  $\mathfrak{g}$  (an abelian group) is  $\sigma$  the conjugacy class contains an element of the form  $\sigma \times g$ ,  $g \in {}^c T$ .

As above  $g$  determines a homomorphism of the Hecke algebra into the complex numbers. If this homomorphism is completely determined by the local zeta functions attached to it then it is completely determined by the conjugacy class of  $\sigma \times g$  and we have a one-to-one correspondence between homomorphisms of the Hecke algebra into the complex numbers and semi-simple conjugacy classes in  $\mathfrak{g} \times {}^c G$  whose projection on  $\mathfrak{g}$  is  $\sigma$ . It is enough to check that the value of

$\chi$  on an element of the form  $\sum_{\omega \in {}^c W} \left( \sum_{k=1}^n \lambda^{\sigma^k} \right) \omega$  where

$\sum_{k=1}^n \lambda^{\sigma^k}$  belongs to the positive Weyl chamber, is determined by the local zeta functions. This can be done by the usual sort of induction for  $\sum \lambda^{\sigma^k}$  is invariant under  $\mathfrak{g}$  and thus the highest weight of a representation of  $\mathfrak{g} \times {}^c G$  whose restriction to  ${}^c G$  is irreducible.

Now I am going to try to define the Artin-Hecke L series. To do this let us fix for each  $p$  an embedding of  $\mathbb{Q}$ , the algebraic closure of  $\mathbb{Q}$ , in  $\overline{\mathbb{Q}}_p$ . We will have to come back later and check that the series are independent of these choices. The choice will be implicit in the next paragraph.

Suppose we have a twisted form  $\overline{G}$  of  $G$  over the rationals. The twisting can be accomplished in two steps. First for a suitable Galois extension  $K$  of  $\mathbb{Q}$  take a homomorphism  $\sigma$  of  $\mathfrak{g} = \mathfrak{g}(K/\mathbb{Q})$  into  $\mathfrak{h}$  to obtain  $G^\sigma$ . Then take an inner twisting of  $G^\sigma$  by means of the

conjecture  $\lambda_2 \in \mathcal{O}_S$ . Let me assume the truth of the

following:

(i) Suppose  $G$  is a linear group acting on  $V$ . Let  $L$  be a Chevalley lattice in  $V_{\mathbb{Q}}$ . Then the intersection of  $G_{\mathbb{Q}_p}^S$  with the stabilizer of  $L \otimes_{\mathbb{Z}} \overline{\mathbb{Z}}_p$  ( $\overline{\mathbb{Z}}_p$  is the ring of integers in  $\overline{\mathbb{Q}}_p$ ) is, for almost all  $p$ , one of the maximal compact subgroups referred to above.

(ii) For almost all  $p$  the restriction of  $\lambda_2$  to  $\mathcal{O}_S(K_{\mathbb{Q}_p}/\mathbb{Q}_p) = \mathcal{O}_S(K_p/\mathbb{Q}_p) = \mathcal{O}_S$  splits. Moreover there is a  $b$  in the intersection of  $G_{K_p}$  with the stabilizer of  $L \otimes_{\mathbb{Z}} \overline{\mathbb{Z}}_p$  so that  $a_{\sigma} = b^{1-\sigma} \bar{b}$ ,  $\sigma \in \mathcal{O}_S$ .

Now take a  $p$  satisfying (i) and (ii) for which  $\lambda_2$  does not ramify in  $K$ . Since  $\bar{G}_{\mathbb{Q}_p} = \{g \in G_{K_p}^S \mid \lambda_2(g) = \bar{b}, \sigma \in \mathcal{O}_S\}$  the map  $g \rightarrow \lambda_2(g)$  is an isomorphism of  $\bar{G}_{\mathbb{Q}_p}$  with  $G_{\mathbb{Q}_p}^S$ . Moreover we can take  $\bar{G}_{\mathbb{Z}_p}$  to be the intersection of  $\bar{G}_{\mathbb{Q}_p}$  with the stabilizer of  $L \otimes_{\mathbb{Z}} \overline{\mathbb{Z}}_p$  so the map takes  $\bar{G}_{\mathbb{Z}_p}$  to  $G_{\mathbb{Z}_p}$ . The natural map isomorphism of the Hecke algebras is independent of the choice of  $b$ . Now  $\bar{G}_A = \prod_p \bar{G}_{\mathbb{Q}_p}$ . Suppose we have an automorphic form  $\phi$  on  $\bar{G}_{\mathbb{Q}}/\bar{G}_A$  which is an eigenfunction of the Hecke algebras for almost all  $p$ . Then, for almost all  $p$ , we have a homomorphism of the Hecke algebra into the complex numbers and thus a semi-simple conjugacy class  $\alpha_p$  in  $\mathcal{O}_S \times_S G \subseteq \mathcal{O}_S \times_S G$  if  $\pi$  is a complex representation of  $\mathcal{O}_S \times_S G$  define the Artin-Hecke L series as

$$L(s, \pi, \phi) = \prod_p \frac{1}{\text{det}(1 - \pi(\alpha_p) p^{-s})} \quad (\text{Product is taken over almost all } p)$$

embeddings of  $\bar{Q}$  into  $\bar{Q}_p$ . For the moment fix  $p$ . We have used the original embedding to identify  $\bar{Q}$  with a subfield of  $\bar{Q}_p$ . Let us preserve this identification. Any other embedding is obtained by sending  $x \rightarrow x^z$  with  $z \in \text{Gal}(\bar{Q}/Q)$ . If we use the original embedding to identify  $\text{Gal}(\bar{Q}_p/Q_p)$  with a subgroup of  $\text{Gal}(\bar{Q}/Q)$  the map of  $\text{Gal}(\bar{Q}_p/Q_p)$  into  $\text{Gal}(\bar{Q}/Q)$  given by the new embedding is  $\sigma \rightarrow z\sigma z^{-1}$  (I identify  $z$  with its image in  $\text{Gal}(\bar{Q}/Q)$ ). The restriction of  $\delta$  to  $\text{Gal}(\bar{Q}_p/Q_p)$  is replaced by  $\delta'$  with  $\delta'(\sigma) = \delta(z\sigma z^{-1})$ . Thus  $G_{\bar{Q}_p}^\delta$  is replaced by  $G_{\bar{Q}_p}^{\delta'}$ .

The map  $g \rightarrow g^{\delta(z)}$  is an isomorphism of  $G_{\bar{Q}_p}^{\delta'}$  with  $G_{\bar{Q}_p}^\delta$ . If  $g \in G_{\bar{Q}}^\delta \subset G_{\bar{Q}_p}^\delta$  then  $g$  is the image of  $g^z$  so this image commutes with the embedding of  $G_{\bar{Q}}^\delta$  in the two groups. The new cycle  $\{a_\sigma\}$  is the image of  $a_{z\sigma z^{-1}} = a_z^{\sigma z^{-1}} a_\sigma^{z^{-1}} a_{z^{-1}} = a_z^{\sigma z^{-1} z^{-1}} a_\sigma^{z^{-1}} a_z^{z^{-1}}$  since  $a_\sigma z = a_\sigma^z a_z$  for all  $\sigma$  and  $z$ . The map is  $\delta(z) a_z^\sigma a_\sigma a_z^{-1} \delta(z^{-1})$ .

Thus

$$\bar{G}_{\bar{Q}_p}^{\delta'} = \{g \in G_K \mid g = g^{\delta(z) \sigma \delta(z) a_z^\sigma a_\sigma a_z^{-1} \delta(z^{-1})} = g^{\delta(z) a_z \sigma \delta(z) a_\sigma a_z^{-1} \delta(z^{-1})} \text{ for } \sigma \in \text{Gal}(\bar{Q}_p/Q_p)\}$$

And the map  $g \rightarrow g^{\delta(z) a_z}$  is an isomorphism of  $\bar{G}_{\bar{Q}_p}^{\delta'}$  with  $\bar{G}_{\bar{Q}_p}^\delta$ . It commutes with the embeddings of  $\bar{G}_{\bar{Q}}^\delta$  in these two groups since  $\bar{G}_{\bar{Q}}^\delta = \{g \in G_K \mid g^{\delta(p)} = g \text{ for all } p \in \text{Gal}(\bar{Q}_p/Q_p)\}$ . Moreover for almost all  $p$  it takes  $\bar{G}_{\mathbb{Z}_p}^{\delta'}$  to  $\bar{G}_{\mathbb{Z}_p}^\delta$ . If then we choose for each  $p$  a new embedding we get a new adelic group  $\bar{G}_A^\delta$ . The above

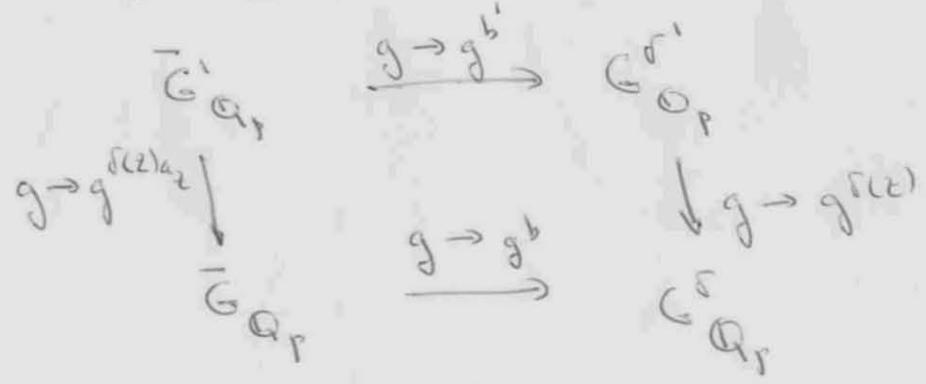
maps define an isomorphism  $\bar{G}_A$  with  $\bar{G}_A$  which takes  $\bar{G}_Q$  to  $\bar{G}_A$  it self. Thus we have a map of  $\bar{G}_Q/\bar{G}_A'$  to  $\bar{G}_Q/\bar{G}_A$  and the automorphic form introduced above defines an automorphic form  $\phi'$  on  $\bar{G}_Q/\bar{G}_A'$  with the same properties. We have to check that  $L(s, \phi', \pi) = L(s, \phi, \pi)$ .

For  $p$  again. Then, if  $a_\sigma = b^\sigma b'^\sigma$

$$a'_\sigma = \delta(z) a_\sigma^\sigma b^\sigma \delta(z^{-1}) \delta(z) b'^\sigma a_\sigma^{-\sigma} \delta(z^{-1})$$

$$= [\delta'(z) \sigma^{-1} \delta(z) a_\sigma b^\sigma \delta(z^{-1}) \delta(z) \delta'(z)] [\delta(z) a_\sigma b^\sigma \delta(z^{-1})]^{-1}$$

So  $a'_\sigma$  is split by  $b' = \delta(z) a_\sigma b^\sigma \delta(z^{-1})$ . For almost all  $p$ ,  $b'$  lies in the stabilizer of  $h \otimes_{\mathbb{Z}} \mathbb{Z}_p$ . Thus we have the following commutative diagram



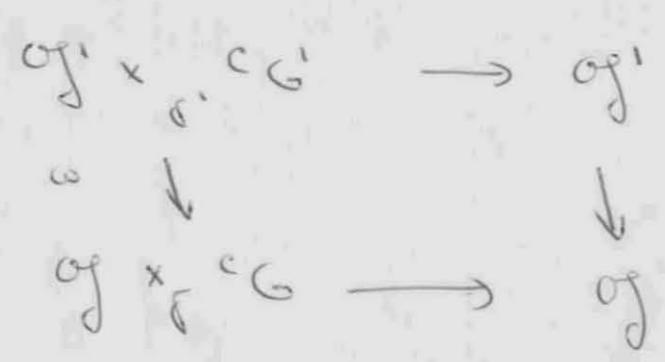
This means that if  $\alpha'_p$  is the conjugacy class in  $\mathbb{Z} \backslash \mathbb{F}_p \mathbb{Z}^{-1} \times \mathbb{F}_p \in G$  associated to  $\phi'$  then  $\alpha'_p = \mathbb{Z} \alpha_p \mathbb{Z}^{-1}$ . This shows that  $\alpha'_p$  and  $\alpha_p$  are conjugate for almost all  $p$  and this shows that  $L(s, \phi', \pi)$  and  $L(s, \phi, \pi)$  differ by a finite number of factors.

The first question is whether or not these products define functions meromorphic in the entire complex plane with poles of the usual type and whether or not for each  $\phi$  there is an automorphic form  $\psi$  so that  $\frac{L(s, \phi, \pi)}{L(s, \psi, \tilde{\pi})}$  is an elementary function for all  $\pi$ .

Before I go into the second question let me just say that I have been making some experiments with Eisenstein series and, although the work is far from completed, it looks as though I will get some series of the above type which because of their relation to the Eisenstein series will be meromorphic in the whole plane. It might even be possible to get a functional equation in a smaller number of cases from the functional equations of the Eisenstein series. The definitions above are the result of trying to find some class of Euler products which will contain the ones coming from the Eisenstein series but which is not restricted in any artificial fashion.

Now if  $G = GL(n)$  and, ~~the~~ action of  $O_f$  is trivial, and  $\pi$  is the representation  $g \rightarrow g$  one can perhaps use the ideas of Tamagawa to ~~get hold of~~ <sup>handle</sup> the above series. This leads to the second question.

Suppose we have  $K, G,$  and  $\delta$  as above, and also  $K', G',$  and  $\delta'$ . If  $K \subset K'$  we have a homomorphism  $O_{f'} \rightarrow O_f$ . Suppose moreover that  $\omega$  is a homomorphism of  $O_{f'} \times_{\delta'} G'$  into  $O_f \times_{\delta} G$  so that the following diagram is commutative



If  $\phi'$  is an automorphic form for some inner form of  $G'$  satisfying the condition we had above then for almost all  $p$   $\phi'$  defines a conjugacy class  $\alpha'_p$  in  $O_{f'} \times_{\delta'} G'$ . ~~Map  $\alpha'_p$  to  $O_f$~~

let  $\alpha_p$  be the image of  $\alpha_j$  in  $\alpha_j \times_{\mathbb{F}} {}^c G$ . The second question is the following. Is there an automorphic form  $\phi$  associated to some inner form of  $G^{\delta}$  such that for almost all  $p$  the conjugacy class associated to it is  $\alpha_p$ .

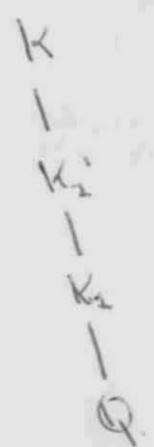
Let me give some ~~idea~~ idea of what an affirmative answer to the question entails

(i) Take  $\alpha_j' = \alpha_j$  and let  $G'$  be a split torus of rank equal to the rational rank of  ${}^c G^{\delta}$  on which  $\alpha_j'$  acts trivially. Let  $A$  be a maximal split torus of  ${}^c G^{\delta}$ . Since  $\alpha_j$  acts trivially on  $A$   $\alpha_j' \times_{\mathbb{F}} {}^c G' \cong \alpha_j \times A \subseteq \alpha_j \times_{\mathbb{F}} {}^c G$ . Since there are  $\ell$  parameter families of automorphic forms on  $G' \backslash G' / A$  an affirmative answer implies the same is true of for some inner form of  $G^{\delta}$ . But this we know from the theory of Eisenstein series.

(ii) Let  $\alpha_j' = \alpha_j$  and let  $G' = \mathbb{Z}$ . Map  $\alpha_j' \times_{\mathbb{F}} {}^c G'$  to  $\alpha_j \times \mathbb{Z} \subseteq \alpha_j \times_{\mathbb{F}} {}^c G$ . In this case it should be possible to give an affirmative answer to the question by taking  $\phi$  to be the automorphic form obtained by setting the parameter equal to zero in a suitable Eisenstein series.  $\phi'$  is of course a constant.

(iii) Now let me say a few words about the relation of the question to the Artin reciprocity law. For the rational field take  $\alpha_j'$  abelian and let  $\chi$  be a character of  $\alpha_j'$ . Let  $\alpha_j = \alpha_j'$  and let  $G$  be a one-dimensional split torus in which  $\alpha_j$  acts trivially. Let us take  $\mathbb{Z} \times 1$  to  $\mathbb{Z} \times \chi(\mathbb{Z})$ . Then an affirmative answer

Now suppose we have the following situation



$K/\mathbb{Q}$  is Galois and  $K_2'/K_2$  is abelian. Let  $G = \text{Gal}(K/\mathbb{Q})$ , let  $G_2$  be the elements of  $G$  which fix  $K_2$  and let  $G_2'$  be the elements of  $G$  which fix  $K_2'$ . Finally suppose  $\chi$  is a character of  $G_2(K_2'/K_2) = G_2'/G_2$  and thus of  $G_2$ . I will take  $G_2' = G$  and

$G' = \text{Gal}(K_2/\mathbb{Q})$ . Let  $L = \mathbb{Q}(z_1, \dots, z_\ell)$  and let  $G = \bigcup_{i=1}^{\ell} G_2 z_i$  with  $z_i \in G_2$ . Suppose that  $z_i, \sigma \in G_2 z_{i\sigma}$ .

Let  $G$  be the direct product  $T_1 \times \dots \times T_\ell$  of  $\ell$  one-dimensional split tori.

Define  $\delta$  by  $(t_1 \times \dots \times t_\ell)^{\delta(\sigma)} = t_{1\sigma^{-1}} \times \dots \times t_{\ell\sigma^{-1}}$ . It is easy

to check that  $\delta(\sigma)\delta(z) = \delta(\sigma z)$ . Moreover  $G'$  is just the multiplicative group of  $K_2$ . Also  $G = G'$ . Define  $p_i(\sigma)$  by  $z_i \sigma^{-1} = p_i^{-1}(\sigma) z_{i\sigma^{-1}}$ .

Then  $z_i z_j^{-1} \sigma^{-1} = p_i^{-1}(z) z_{i\sigma^{-1}}^{-1} \sigma^{-1} = p_i^{-1}(z) p_{i\sigma^{-1}}^{-1}(\sigma) z_{i\sigma^{-1}\sigma^{-1}}$  so

$p_i(\sigma z) = p_{i\sigma^{-1}}(\sigma) p_i(z)$ . Define  $\omega$  by

$$\omega(\sigma \times z) = \sigma \times (\chi(p_1(\sigma)) \times \dots \times \chi(p_\ell(\sigma)))$$

Then

$$\begin{aligned}
 \omega(\sigma \times z) \omega(z \times 1) &= \sigma z \times \prod_{i=1}^{\ell} \chi(p_{i\sigma^{-1}}(\sigma)) \chi(p_i(z)) \\
 &= \omega(\sigma z \times 1).
 \end{aligned}$$

By the way if the  $z_i$ ,  $1 \leq i \leq l$  are replaced by  $z_i' = \mu_i z_i$ , with  $\mu_i \in \mathcal{O}_{z_i}^*$  12  
then  $f_i'(\sigma) = H_{\sigma \rightarrow z_i}^{-1} f_i(\sigma) \mu_i$  and

$$w'(\sigma \times z) = (\chi(\mu_1) \times \dots \times \chi(\mu_l))^{-1} w(\sigma \times z) (\chi(\mu_1) \times \dots \times \chi(\mu_l))$$

so the map does not depend in an essential way on the choice of local representatives.

I will take  $\phi'$  to be a constant. By the Artin reciprocity law there is associated to  $\chi$  a character of  $K_1^* / \prod K_v$ , that is, an automorphic ~~form~~  $\phi$  on  $G_{\mathbb{Q}}^{\sigma} / G_A^{\sigma}$ . I claim that  $\phi$  is the automorphic form which provides an affirmative answer to the question

To show this we make use of the freedom we have in the choice of coset representatives. Let  $p$  be a prime which does not ramify in  $K$ . Fix an embedding of  $K$  in  $\overline{\mathbb{Q}_p}$ . We identify  $K$  with its image, but  $\mathfrak{f}_1, \dots, \mathfrak{f}_r$  be the prime divisors of  $p$  in  $K_{\mathbb{Z}}$ . Choose  $\mu_j, \nu_j$  in  $\mathfrak{f}_j$  so that the map  $\alpha \rightarrow x \mu_j \nu_j^{-1}$  extends to a continuous map of the completion of  $K_{\mathbb{Z}}$  with respect to  $\mathfrak{f}_j$  into  $\overline{\mathbb{Q}_p}$ . Let  $L_j = [K_{\mathbb{Z}} \mu_j \nu_j^{-1} : \overline{\mathbb{Q}_p}]$  and let

$n_j = [L_j : \overline{\mathbb{Q}_p}]$  If  $\sigma_p$  is the Frobenius the automorphisms  $\mu_j \sigma_p^k \nu_j^{-1}$ ,  $1 \leq j \leq r$ ,  $0 \leq k < n_j$  form a set of representatives for the cosets of  $\mathfrak{f}_j$ . If  $Z_i = \mu_j \sigma_p^k \nu_j^{-1}$  then  $f_i(\sigma_p) = 1$  unless  $k=0$  when

$$f_i(\sigma_p) = \mu_j \sigma_p^{n_j} \nu_j^{-1} \quad \text{Thus } w(\alpha_p) = \alpha_p \text{ is the conjugacy class of } \sigma_p \times \prod_{j=1}^r (\chi(\mu_j \sigma_p^{n_j} \nu_j^{-1}) \times 1 \times \dots \times 1)$$

$\mu_j \sigma_p^{n_j} \nu_j^{-1}$  belong to the Frobenius conjugacy class in  $\mathfrak{f}_j$  corresponding to  $\mathfrak{f}_j$ .

On the other hand  $G_{\overline{\mathbb{Q}_p}}^{\delta} \subseteq G_A^{\delta}$  is the set of elements of the form

$$\prod_{j=1}^r \prod_{k=0}^{n_j-1} x_j^{\sigma_p^k} \text{ with } x_j \text{ a non-zero element in } \mathfrak{f}_j. \text{ The restriction of } \phi \text{ to such an element is, by its very definition,}$$

$$\prod_{j=1}^r \chi(\mu_j \sigma_p^{n_j} \nu_j^{-1})^{o(x_j)}$$

if  $|x_j| = p^{-o(x_j)}$ . Since  $G^{\delta} = G^{\delta}$  the associated conjugacy is the one determined by any element

$$\sigma_p \times \prod_{j=1}^r \prod_{k=0}^{n_j-1} \alpha_{jk}$$

such that

$$\prod_{j=1}^r \prod_{k=0}^{n_j-1} \alpha_{jk}^{o(x_j)} = \prod_{j=1}^r \chi(\mu_j \sigma_p^{n_j} \nu_j^{-1})^{o(x_j)}$$

(iv) Finally I want to comment on the implications an affirmative answer to the second question ~~would~~ <sup>might</sup> have for the problem of finding a splitting law for non-abelian extensions. I had planned to discuss arbitrary ground fields but I realize now that I have to take the ground field to be  $\mathbb{Q}$ . However one could presumably go back and reformulate the two questions in the context of groups over a number field. The first question is not sensitive to the choice of ground field but the second is. I did not appreciate this until now; since little would be gained by rewriting the letter I content myself with taking the ground field to be  $\mathbb{Q}$ . ~~for~~

Let  $K$  be a Galois extension of  $\mathbb{Q}$  and let  $G = \text{Gal}(K/\mathbb{Q})$ . We want a method of finding for almost all  $p$  the Frobenius conjugacy class  $\{\sigma_p\}$  in  $G$ . Thus we have to find trace  $\text{tr}(\pi(\sigma_p))$  on the conjugacy class of  $\pi(\sigma_p)$  in  $\text{GL}(m, \mathbb{C})$ , if  $\pi: G \rightarrow \text{GL}(m, \mathbb{C})$ , for all representations  $\pi$  of  $G$ . Let us fix  $\pi$ . As before I will take  $G' = G$ ,  $G' = \{z\}$ , and  $\phi'$  to be a constant function. I will take  $G = \text{GL}(m)$ . Let me check that  ${}^c G$  is also  $\text{GL}(m)$ .

Take  $\tilde{G} = {}^c \tilde{G} = A \times \text{Sk}(m)$  where  $A$  is a commutative split torus. Then

$${}^c \tilde{L} = \tilde{L} = \{(z, z_1, \dots, z_m) \mid z, z_i - z_j \in \mathbb{Z}, \sum_{i=1}^m z_i = 0\}$$

$${}^c L = L = \{(z, z_1, \dots, z_m) \mid z_i + \frac{z}{m} \in \mathbb{Z}, \sum_{i=1}^m z_i = 0\}$$

$$\tilde{L}' = \tilde{L}' = \{(mz, z_1, z_2 - z_1, \dots, z_{n-1} - z_{n-2}, -z_{n-1}) \mid z, z_i \in \mathbb{Z}\}$$

The pairing is given by

$$\langle (z, z_1, \dots, z_m), (\gamma, \gamma_1, \dots, \gamma_m) \rangle = \frac{z\gamma}{m} + \sum_{i=1}^m z_i \gamma_i$$

In any case  $G = \overline{G} = G(\mathbb{R})$ . Define  $\omega$  by

$$\omega(\sigma \times 1) = \sigma \times \pi(\sigma)$$

The action of  $\omega$  on  $G$  is to be trivial. Since  $\omega(\alpha_p) = \alpha_p$  is the conjugacy class of  $\sigma_p \times \pi(\sigma_p)$  which of course determines the conjugacy class of  $\pi(\sigma_p)$  all we need a method of finding  $\alpha_p$ .

Suppose there is an automorphic form  $\phi$  on some inner form of  $G(\mathbb{R})$  which provides an affirmative answer to the above question. To find  $\alpha_p$  all we need do is calculate the eigenvalues of a finite number of elements of the Hecke algebra  $H_p$  corresponding to the eigenfunction  $\phi$ . Choose a finite set  $S$  of primes containing the infinite prime so that if  $\overline{G}_S = \prod_{q \in S} \overline{G}_{\mathbb{Q}_q}$  and  $\overline{G}_{S^c} = \prod_{q \notin S} \overline{G}_{\mathbb{Q}_q}$

then  $\overline{G}_A = \overline{G}_{\mathbb{Q}} \overline{G}_S \overline{G}_{S^c}$  and  $\phi$  is a function on  $\overline{G}_{\mathbb{Q}} \backslash \overline{G}_A / \overline{G}_{S^c}$

Suppose  $p \notin S$  and  $f$  is the characteristic function of  $\overline{G}_{\mathbb{Z}_p} \backslash \overline{G}_{\mathbb{Z}_p}$  which is the disjoint union  $\cup_{i=1}^n a_i \overline{G}_{\mathbb{Z}_p}$ . If  $g \in G_S$

$$\begin{aligned} \chi(f)\phi(g) &= \int_{\overline{G}_{\mathbb{Z}_p}} \phi(gh) f(h) dh \\ &= \sum_{i=1}^n \phi(g a_i) = \sum_{i=1}^n \phi(a_i g) \end{aligned}$$

Since  $a_i \in \overline{G}_{\mathbb{Q}_p}$  ~~Choose~~ Choose  $\bar{a}_1, \dots, \bar{a}_n$  in  $\overline{G}_{\mathbb{Q}}$  so that  $\bar{a}_i^{-1} a_i \in \overline{G}_{S^c}$  and let  $b_i$  be the projection of  $\bar{a}_i$  on  $\overline{G}_S$ . If  $\chi(f)$  is the ~~characteristic~~ eigenvalue of  $f$

$$\begin{aligned} \chi(f)\phi(g) &= \sum \phi(\bar{a}_i^{-1} a_i g) \\ &= \sum \phi(b_i^{-1} g) \end{aligned}$$

Now roughly speaking the elements  $\bar{a}_1, \dots, \bar{a}_n$  are obtained by solving some diophantine equations involving  $p$  as a parameter. Then  $\phi(h_i^{-1}g)$  depends upon the congruential properties of  $\bar{a}_i$  modulo powers of the finite primes in  $S$  and the position of  $\bar{a}_i$  on  $\bar{G}_{\mathbb{Q}_p} = \bar{G}_{\mathbb{R}}$ . If, for each  $g$  in  $\bar{G}_S$ ,  $\phi(hg)$  as a function of  $h$  in the connected component of  $\bar{G}_{\mathbb{R}}$  were rational we would get a good splitting law. It would be rather complicated but in principle not worse than the splitting law of Dedekind-Hasse for the splitting field of a cubic equation. However because of the strong approximation  $\phi(hg)$  will probably not be rational unless  $m=1$  or  $2$ . Thus we could only get a transcendental splitting law.

Nonetheless if we took  $G$  to be the symplectic group in  $2n$  variables and  ${}^cG$  to be the orthogonal group in  $2n+1$  variables then strong approximation is no obstacle because  $G$  has inner forms for which  $\bar{G}_{\mathbb{R}}$  is compact and we might hope to obtain laws about such things as the order of  $\sigma_p$  by considering embeddings of  $G$  in  ${}^cG$ .

Yours truly,  
 R. Langlands

Postscript: let me add

(\*) let  $K$  be a quadratic extension of  $\mathbb{Q}$ . let  $\mathfrak{o}_K = \mathfrak{o}_K = \mathfrak{o}_K(K/\mathbb{Q})$ . let  $G' = {}^cG' = A_2 \times A_2$  where  $A_1$  and  $A_2$  are one dimensional split tori. if  $\sigma$  is the non-trivial element of  $\mathfrak{o}_K$  let  $(t_1 \times t_2)^{\sigma} = t_2 \times t_1$ . let  $G = GL(2)$  and let  $\mathfrak{o}_K$  act trivially on  $G$ . Define  $\omega$  by

$$\omega(1 \times (t_1, t_2)) = \begin{pmatrix} t_1 & 0 \\ 0 & t_2 \end{pmatrix}$$

$$\omega(\sigma \times (t_1, t_2)) = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} t_1 & 0 \\ 0 & t_2 \end{pmatrix} = \begin{pmatrix} 0 & t_2 \\ t_1 & 0 \end{pmatrix}$$

$G'_A$  is just the idèle group of  $K$ . Take  $\phi'$  to be a Größencharakter. It is not inconceivable that the work of Hecke and Maass on the relation between

L series with Größencharakter from a quadratic field and automorphic  
forms will provide an affirmative answer to the second question in this  
case

*Prof. Weil*

January 18, 1967

Dear Professor Weil:

Thank you for your letter of January 17. I would hope that you still feel it your duty to form a judgment, to the extent that you can, on the merits of a proposed appointment in another faculty, in pursuit of the concern we all share for the intellectual standards of the Institute. Should this lead you to a conclusion at variance with that of the nominating School, I would wish to be informed, and would ask for comment by the nominating School. If, after such discussion, I thought that there were still substantial unresolved issues, I would not consider it desirable to forward the nomination to the Trustees.

By this procedure, initiated with the proposed appointment of Rosenbluth, I seek to avoid the extremes of, on the one hand, complete withdrawal of faculty concern for appointments in Schools outside their own, and, on the other, of scholars in one field settling by vote the qualifications of those in quite another.

Sincerely yours,

Carl Kaysen

Professor A. Weil  
Institute for Advanced Study

cc: Professor Montgomery

Communicated by André Weil

From: THE NEW YORK TIMES, SATURDAY, JUNE 1, 1968

## Change in Columbia Board Proposed

By MURRAY SCHUMACH

Major changes in the composition of Columbia University's board of trustees were urged yesterday by the dean of the Graduate School of Journalism as part of a program to increase the authority of the faculty and the participation of students in university decisions.

In a report to the journalism school's 3,000 alumni, Dean Edward W. Barrett recommended sweeping innovations to build "a stronger and more rational university" and to avert future student demonstrations and violence such as have disrupted the institution since April 23.

The report recommended the following:

¶As vacancies occur in the board, as many as 8 of the 24 seats go to persons with "faculty status," not more than half of whom have deanships or comparable administrative jobs. Faculty members are now excluded from the board by the university's charter.

¶Of the six trustees who must be alumni, two should be under 35. The average age of the board today is 62.

¶Two student trustees, "selected by their peers," would discuss and vote on "those questions of direct concern to students."

### Faculty Concur

"This faculty and I," the report said, "believe that there is basis for the faculty-student discontent. The governing structure for a small colonial college is not necessarily right for a great urban university of 1968. The trustees of this and other universities are, by their very nature, likely to be out-of-touch."

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

January 17, 1967

Dr. Carl Kaysen  
Director  
Institute for Advanced Study  
Princeton, New Jersey

Dear Dr. Kaysen:

I have just received the documentation concerning Rosenbluth. I should like to know what I am supposed to do about it.

Until this moment, I knew nothing about him, nor about his subject; therefore I have no intelligent question to ask, and no comment to offer.

When the Faculty had to vote on all candidates, I held it my duty to attempt an independent evaluation of their merits, through any channels of information within my reach; sometimes this led me to conclusions utterly at variance with those of the nominating school. If this is still my duty, I shall try to discharge it; if I am told that it is not, I shall feel happy to be relieved of an irksome task, and just hope for the best.

Sincerely yours,



A. Weil

AW:mp

cc: Professor Montgomery

31 March 1966

Dear Mr. Bernstein:

In response to your request of March 21st, we are sending you the enclosed presentation on Professor Weil, which was prepared by a colleague of his at the time of his appointment to the faculty of the Institute.

Sincerely yours,

(Mrs. Wilder Hobson)  
Secretary to the Director

Mr. Michael J. Bernstein  
Committee on Education and Labor  
House of Representatives  
Washington, D. C.

### Report on André Weil

André Weil was born in Paris in 1906. There he also studied mathematics and got his doctor's degree in 1928. He then held teaching positions as follows: Professor at Aligarh University, India, 1930-32; Maitre de Conférence, University of Marseille, 1932-33; Maitre de Conférence, University of Strasbourg, 1933-40; Lecturer at Haverford and Swarthmore Colleges during the war years; Professor at the University of São Paulo, Brazil, 1945-47; and Professor at the University of Chicago since 1947. He was at the Institute for Advanced Study from January to May 1937.

Surveying the world of mathematics and mathematicians today, it is extremely rare to find someone who masters with real knowledge and insight more than one or two of the main fields of the subject. A person really able to look upon mathematics as a whole with comprehensive knowledge and deep understanding of all these major fields is again a quite singular occurrence. André Weil in this respect occupies a rather unique position among his contemporaries, and could only be compared with Hermann Weyl in his thorough and wide knowledge and deep insight in contemporary as well as classical mathematics.

His scientific production of papers and books deals with such a great variety of subjects as number theory and algebra, algebraic geometry, topological groups, analytic functions in several variables, differential geometry and even differential equations, and shows him to possess great power of penetration into the most difficult problems, ability to see

connections between apparently distant parts of mathematics, and a high degree of originality in devising methods and techniques. Among his contributions are some that will undoubtedly always be rated among the finest achievements of mathematics in our time. His papers and books are written with a strong sense for the essential and fundamental and not least for mathematical elegance and beauty.

A few of the most spectacular results of Weil will be mentioned below; these are selected also because they lie closest to the present writer, in that the results, though mostly obtained by methods of algebraic geometry, have deep consequences for number theory.

Weil's thesis in 1928 at once established him as a mathematician of first rank. This paper (which by the way had the unusual distinction of being accorded a review of six pages in the *Jahrbuch über die Fortschritte der Mathematik*), dealt with the problem of the rational points on algebraic curves, or phrased differently it dealt with the properties of the set of rational solutions of an equation of the form  $P(x, y) = 0$ , where  $P$  is any polynomial in  $x$  and  $y$  with rational coefficients. Special problems of this category had been considered in mathematical literature far back, but the first results with some claim of generality were very recent. Bypassing the history for the simplest case when the curve has genus zero, we mention here only that H. Poincaré had attacked this problem for curves of genus one, his attempt although it failed, led him to certain conjectures about the structure of the set of rational points, which were later proved

by L. J. Mordell in 1922, namely that the set of all such points could be obtained by certain rational operations from a certain finite subset of them, which we refer to as a finite basis. Mordell's results were rightly considered a great achievement at the time, so it seemed no less than sensational when Weil's thesis appeared treating the general case of arbitrary genus greater than one with corresponding results. Actually Weil's results went even beyond the case of an algebraic curve, in that it considered general abelian varieties, and the conclusions for curves followed from the special case that the abelian variety is the jacobian variety of an algebraic curve.

The results of Weil's thesis formed the essential basis for Siegel's result about the integral points on algebraic curves, which in a certain sense closed the history of diophantine equations with two unknowns.

A probably even more outstanding achievement was Weil's proof in 1941 of the so-called Riemann hypothesis for the zeta-functions of function fields over a finite constant field. These zeta-functions had first been introduced by Artin in the early twenties as analogues of the classical zeta-functions of algebraic number fields, and certain properties like that of the existence of a functional equation had then, by various authors in the late twenties and the thirties, been established for these new functions. The fundamental questions about the location of the zeros, which are still unresolved for the classical zeta-functions, were, after some very special results had been obtained by Mordell, Davenport and Hasse,

first attacked in a somewhat general situation by H. Hasse who in 1934 was able to give a proof of the Riemann hypothesis for the case of an elliptic function field (or as one would rather say today for the zeta-function of a curve of genus one over a finite field). This result at the time was major progress.

Weil had the idea that algebraic geometry would have to form the basis for an attack on the problem in its full generality, namely for arbitrary genus, but in order to bring it to bear on the problem he first had to develop a unified theory of algebraic geometry that covered the case that the underlying number field had prime-characteristic as well as the case of characteristic zero; this in itself was a contribution of great importance. Weil's proof of the Riemann hypothesis for function fields over a finite constant field, has rather profound number theoretical consequences, for instance about the number of solutions of a general type of congruence, and also about the order of magnitude of certain types of sums that play an important role in analytic number theory.

In this connection it also deserves mention that Weil in the last years has introduced the more general concept of the zeta-function of an algebraic variety of higher dimension than a curve, and conjectured certain general rules for the distribution of zeros and poles of these, in particular also certain connections with the so-called Betti numbers of the variety. While these conjectures so far only have been proved for special classes of varieties, partly by Weil himself, partly by others, and undoubtedly lie

5.

extremely deep, so that one might expect the resolution of these problems to take a long time, they have, as shown for instance by the statement in J-P. Serre's letter, caught the imagination of some of the most promising young mathematicians and may strongly influence and direct the research in this part of mathematics in coming years.

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André Weil

4.

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EIGHTY-NINTH CONGRESS

Committee on Education and Labor  
HOUSE OF REPRESENTATIVES  
Congress of the United States  
Washington, D.C.

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AND LABOR  
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CHARLES W. RADCLIFFE,  
SPECIAL EDUCATION COUNSEL FOR  
MINORITY  
EXTENSION 3725

March 21, 1966.

The Institute of Advanced Studies,  
Princeton,  
New Jersey.

Dear Sirs:

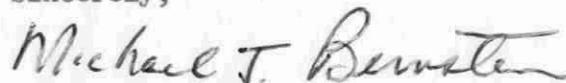
Several years ago a story in the New York Times reported the appointment of a number of eminent scholars to the Institute. Among them was the mathematician, Professor André Weil, a Frenchman, from the University of Paris, if my memory serves me correctly.

In its story the New York Times set forth the citations describing the achievements in the career of each of the appointees. I am particularly interested in getting a copy of the text of the citation concerning Professor Weil. Because I do not recall the date of the newspaper story (not even the year), I have found it a hopeless task to run down the issue of the New York Times in which the story appeared.

If a copy is available, I would deeply appreciate your sending the one on Professor Weil to me. If it is not, perhaps you could give me some idea of the relevant date which would greatly help me in tracing the story in the New York Times.

Thank you for any help you can give me.

Sincerely,



Michael J. Bernstein,  
Minority Counsel.

MJB:rm

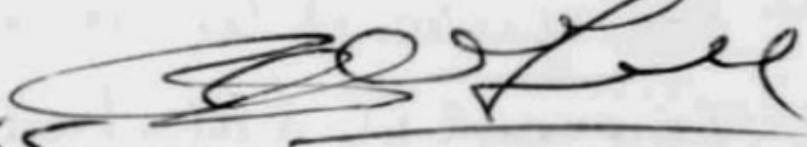
Auguste - Comte a Paris, avant  
la guerre. Il a revu Madame  
Weill il y a 3 ans environ.  
Maurice Weill doit avoir  
une chaire a Princeton?

Merci d'avance.

Devoies, substantifs

Very truly

2.12.65



Fac Weil

## BERNARD MANCEAU

ANCIEN DÉPUTÉ DE MAINE-ET-LOIRE

DIRECTEUR DE " L'INTÉRÊT EUROPÉEN - EUROPE ET RÉGIONS "

PRÉSIDENT DU CRÉDIT IMMOBILIER DE L'ANJOU

ET DE LA S. C. D'H. L. M. "COIN DE TERRE ET FOYER"

Admireait que ce journal  
soit communiqué à M. Weil,  
Weil, dont il a connu le père,  
la mère et la sœur,  
quand il habitait dix-neuf rue

20 RUE DES ÉBÉNIS

ANGERS

13, RUE TRAVOT

CHOLET

TÉL. 62-20-19

With compliments of

BERNARD MANCEAU

*Docteur en Droit*  
ANCIEN DÉPUTÉ DE MAINE-ET-LOIRE

DIRECTEUR DE "L'INTÉRÊT EUROPÉEN - EUROPE ET RÉGIONS"

PRÉSIDENT DU CRÉDIT IMMOBILIER DE L'ANJOU

ET DE LA S. C. D'H. L. M. "COIN DE TERRE ET FOYER"

(et Président du Syndicat  
indépendant de la  
presse européenne)



Manitly 2.12.65

28, RUE DESJARDINS  
ANGERS

13, RUE TRAVOT

CHOLET

TÉL. 62-20-19

La bibliothèque de l'Institut reçoit-elle bien l'É.?

17 December 1965

Dear Professor Weil:

The Director has told all who have asked that the appointments of Adler, Dashen, Goldberger, Gell-Mann, and Palmer were approved, after prolonged discussion, by the Board of Trustees. The letters of invitation have been mailed.

Sincerely yours,

(Mrs. Wilder Hobson)

Professor André Weil  
The Institute for Advanced Study

file: Faculty - Weil. Complete file refers  
to Institute procedures, so is filed under  
Schools of the Institute - Mathematics Miscellaneous

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

OFFICE OF THE DIRECTOR

3 November 1964

Dear André:

Your letter of October 29th came in my absence, and this is my first opportunity to respond.

You have asked for a written account of what I said to you on October 21st about the procedures of the Faculty in Mathematics. Since you responded to what I said with "This means war", I had thought that you would know what the "war" was all about. What I said was ~~this~~ <sup>that I did</sup> I do not propose for the next two years to continue to implement recommendations arrived at in discussions from which I have been systematically and totally excluded.

As for Hasenjaeger, there <sup>should</sup> ~~will~~ be no recurrence. I am going ahead with a committee on mathematical logic. I should like to inform all members of the Faculty in Mathematics of the meetings of this committee, so that they may attend if they wish.

Robert Oppenheimer

Robert Oppenheimer

Professor André Weil  
The Institute for Advanced Study

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

2nd draft

OFFICE OF THE DIRECTOR

2 November 1964

Dear André:

Your letter of October 29th came in my absence. This is my first opportunity to respond. My response will be unfortunately long, because both your requests are based on false premises.

First, I did not promise to give you a written statement. The procedures of the Faculty in Mathematics were first discussed by you when we met on October 1st. At that time, you told me that you planned for the next two years to continue the practices which had been followed by your predecessor, Atle Selberg. I will not attempt to remind you of the elements of blackmail with which you surrounded this announcement.

I did say to you, as I had often said to Selberg, that the procedures were not working well; that I was not content with them; and that you should not construe the fact that I was not arguing the matter with you as an expression of assent. When we met again, on October 21st, I told you that I did not propose for the next two years to continue to take actions on the basis of recommendations arrived at in discussions from which I was systematically and totally excluded: for I have not known what arguments had been advanced nor who advanced them. You thereupon said, "This means war." You then shortly asked for a written statement of what I had just said. I remarked that it was odd for you to ask for a written statement in answer to your oral one.

On Hasenjaeger, the recommendation of the Mathematics Faculty of March 24, 1964 was made in my absence, in the absence of Professor Gödel, in the absence of relevant information, and without adequate explanation. I do not wish for a recurrence.

I have established a committee on logic and the foundations of mathematics, with Professor Gödel and Professor Whitney as members, who will meet with me when necessary. I should like to inform other members of the Mathematics Faculty, so that they may attend if they wish. This will insure against a recurrence of the procedures of the Hasenjaeger appointment. Clearly, I hope that you, and other members of the Mathematics Faculty, will be pleased by these arrangements.

It seems to me clear that an appointment made on the recommendation of a Professor whose colleagues have in the past been supported by the Mathematics Stipend Fund should be similarly supported by that fund, or, if more convenient, by funds charged to one of the applicable contracts or grants.

Robert Oppenheimer

Professor André Weil  
The Institute for Advanced Study

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

1st draft

OFFICE OF THE DIRECTOR

2 November 1964

Dear André:

Your letter of October 29th came in my absence. This is my first opportunity to respond. My response will be unfortunately long, because both your requests are based on premises, which are not true.

First, ~~As to the procedures of the faculty in Mathematics, and my views on them, I did not promise to give you a statement in writing.~~ These procedures were first discussed by you with me when we met on October 1st. At that time, you told me that you planned for the next two years to continue the practices which had been followed by your predecessor, Atle Selberg. I will not attempt to describe the elements of blackmail with which you surrounded this announcement. I did tell you, as I had often told Selberg, that the procedures were not working well; that I was not content with them; and that you should not construe the fact that I was not arguing the matter with you as an expression of assent. When we met again, on October 21st, I told you that I did not propose for the next two years to continue to take actions on the basis of recommendations arrived at in discussions from which I was systematically and totally excluded: I gave a very brief explanation of my reasons: You thereupon said, "This means war." You then shortly asked for a written statement of what I had just said. I remarked that it was odd for you to ask for a written statement in answer to a statement orally made by you. [I neither asked you for a written statement, nor promised one.] I also thought it odd that after declaring "war", you asked

As for your Hasenjaeger alternatives, they could well be left undecided, since as you know the final allocation of budget items to appropriate sources of funds is often made only rather late in the fiscal year. What I have to say is this: ~~The Hasenjaeger appointment was in many respects quite out of order. The primary reason was that the recommendation of the Mathematics Faculty of March 24, 1964 was taken in my absence, in the absence of Professor Gödel, in the absence of relevant information, and without adequate explanation. I do not wish for a recurrence. I plan to establish a committee on logic, and on the foundations of mathematics, with Professor Gödel and Professor Whitney as members, and to ask the committee to meet with me when necessary, and to inform the other members of the Mathematics Faculty of the meetings should they wish to attend. This should be adequate insurance against a recurrence of the procedures of the Hasenjaeger appointment. Clearly, I hope that you, and other members of the Mathematics Faculty, will approve these arrangements; equally clearly, they should be subject to reconsideration should Professor Gödel or other members of the Mathematics Faculty wish again to meet as a group.~~ It seems to me clear that an appointment

I have not known what arguments had been advanced nor who advanced them.

- 2 -

made on the recommendation of a <sup>Professor</sup> ~~Faculty member~~ whose <sup>colleagues</sup> ~~members~~ have in the past been supported by the Mathematics Stipend Fund should, ~~despite all irregularity in the making of the appointment,~~ be similarly supported by that fund, or, if more convenient, by funds charged to one of the applicable contracts or grants.

Robert Oppenheimer

Professor André Weil  
The Institute for Advanced Study

*To Weil*

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY

SCHOOL OF MATHEMATICS

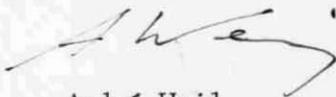
October 14, 1964

Dr. Robert Oppenheimer  
Institute for Advanced Study

Dear Robert:

Item 6 of the enclosed Minutes will have to be explained to you in greater detail. I shall get in touch with you within the next few days.

Sincerely yours,



André Weil

AWcdu  
Enclosure

THE INSTITUTE FOR ADVANCED STUDY

WASHINGTON, D.C. 20540

SCHOOL OF MATHEMATICS

October 14, 1984

Dr. Robert Oppenheimer  
Institute for Advanced Study

Dear Robert:

$$d = \frac{gt^2}{2}$$

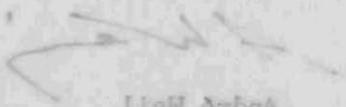
$$100 = \frac{32}{2} t^2$$

Item 6 of the enclosed Minutes will have to be

explained to you in greater detail. I shall get in

touch with you within the next few days.

Sincerely yours,



André Weil

WJW  
Enclosure

LAW OFFICES

**WEIL, VATZ & WEIL**

FERDINAND T. WEIL  
S. ALLEN VATZ  
ANDREW L. WEIL

SUITE 722 FRICK BUILDING

ATLANTIC 1-2690

PITTSBURGH 19, PA.

October 22, 1963

Monsieur Andre Weil  
Princeton University  
Princeton, N. J.

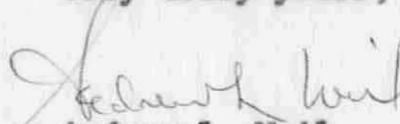
Dear Sir:

The enclosed letter was erroneously directed  
to me.

I was a graduate of Princeton (Class of 1943)  
and apparently have the anglicized version of your name.

I apologize for opening the letter, but I  
am sure you understand.

Very truly yours,

  
Andrew L. Weil

ALW:pm

Enc.

*orig &  
enclosures  
sent to Prof Weil  
10/25*

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

February 12, 1963

Professor A. Weil  
3 rue Auguste-Comte  
Paris (6e), France

Dear Professor Weil:

Dr. Oppenheimer has asked me to reply to your letter of February 7th because I am more familiar with the details of your grant.

The original proposal was for the lump sum of \$7,500 as you will see in the Director's letter of May 3rd (enclosed) to Dr. Grad. You will note that the last sentence offers to "recast this application in another form". I believe there was a telephone call following this letter, and the budget breakdown (also enclosed) was then submitted.

In answer to your question (a) the official letter of notification awarding the grant simply mentions the lump sum, but of course they do have this budget in their file.

In answer to your question (b) no reduction was made in your normal \$1,000 appropriation from the Institute for travel even though you are on leave for one term. (This is standard procedure with faculty members on leave, just as we do go on paying our share of your TIAA pension).

Therefore you have credits since July 1st in your travel fund of \$1,500, \$1,000 from the Institute, and \$500 from the National Science Foundation. I shall be happy to handle the \$500 which has been credited to your travel account in any way that you ask. We can either leave it there and let you make whatever disposition you see fit on your return, or we can take it back out again and convert it into salary spread over the next five months.

I shall await further word from you as to what disposition you wish me to make of the matter.

Cordially yours,

Minot C. Morgan, Jr.  
General Manager

MCM:lw  
Enclosures 2

Copy to Dr. R. Oppenheimer

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

3 rue Auguste-Comte, Paris (6<sup>e</sup>)  
February 7, 1963.

SCHOOL OF MATHEMATICS

Dr. R. Oppenheimer  
Institute for Advanced Study  
Princeton, N.J.

Dear Robert:

Best thanks for the copies of your correspondence with Dr. Waterman of the N.S.F., showing that my contract has finally gone through.

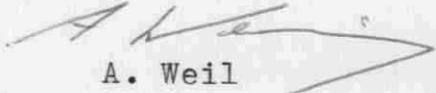
In connection with this, I have also received a note from Mike Morgan, which says: "The enclosed represents the first payment of your \$ 7,000 grant from the N.S.F. We have also credited your Institute travel account with \$ 500 from the same source".

This raises two small questions:

(a) The N.S.F. grant is for \$ 7,500; have they specifically earmarked \$ 500 for travel, or is that left to the discretion of the Institute ?

(b) Is it your view that, for the current year (1962-63), my travel grant from the Institute should be only \$ 500 instead of the usual \$ 1,000 ? In a sense, this would be understandable, since the understanding was that, if the N.S.F. grant came through, I should be on leave without pay for the second term (although it was never specifically stated that the leave should be both without pay and without travel grant). On the other hand, when I came to see you about this in the first place, we calculated that my grant from the I.H.E.S. in Paris would amount to (very nearly) \$ 5,000, so that the loss in salary would be \$ 7,500, and this was why the application to the N.S.F. was made for that amount, on the assumption that I should not lose out on this: had we figured out, at that time, that my Institute travel grant would also be halved for 1962-63, then I would undoubtedly have asked you to apply to the N.S.F. for \$ 7,500 (salary) plus \$ 500 (travel grant), and it is hardly to be doubted that they would have granted it. It may therefore be argued that, in fairness to me, my Institute travel grant should be in the usual amount of \$ 1,000 for the whole year. In that case, it would still remain to be seen whether it might not be advantageous to me (from the point of view of my income-tax) to credit \$ 500 from the N.S.F. grant to my travel account, rather than book it as salary. But, before considering this last question, I should like to understand the situation better; and I should feel very much obliged if you could clarify it for me.

Sincerely yours

  
A. Weil

*Fae Weil*

24 January 1963

GP-623

cc Professor Weil + copy  
Mr. Morgan of NSF  
letter

Dear Dr. Waterman:

This will acknowledge, with our thanks, your letter of January 22nd, in which you inform us that the National Science Foundation is granting to the Institute for Advanced Study the sum of \$7,500 for the support of research entitled "Arithmetic Theory of Algebraic Groups" under the direction of André Weil. We are glad to accept this grant under the conditions outlined in your letter. We appreciate very much the Foundation's action.

With all good wishes,

Robert Oppenheimer

Dr. Alan T. Waterman, Director  
National Science Foundation  
Washington 25, D. C.

NATIONAL SCIENCE FOUNDATION

WASHINGTON 25, D.C.

JAN 22 1963

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

GP-823

Dear Dr. Oppenheimer:

I am pleased to inform you that the sum of \$7,500 is hereby granted by the National Science Foundation to The Institute for Advanced Study for the support of research entitled "Arithmetic Theory of Algebraic Groups," under the direction of Andre Weil, School of Mathematics, for a period of approximately one year, effective January 1, 1963. Payment of this grant will be made in approximately two weeks.

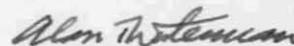
It is a condition of this grant that it may be revoked in whole or in part by the Foundation after consultation with the principal investigator and the grantee, except that a revocation shall not affect any commitment which, in the judgment of the Foundation and the grantee, had become firm prior to the effective date of the revocation; and that funds not committed by the grantee prior to the conclusion of the work contemplated under this grant shall be returned to the Foundation.

The grantee shall furnish to the Foundation promptly a written disclosure of each invention conceived or first actually reduced to practice in the performance of work supported by this grant, together with a statement specifying whether or not foreign and/or domestic patent applications will be filed. Upon application for any patent on any such invention, the Government shall be granted an irrevocable, royalty-free, nonexclusive license for use of such invention for governmental purposes throughout the world (including use pursuant to any treaty or international obligation of the United States). In those countries where a patent application is not to be filed, the Foundation may file for such patent on behalf of the Government. In any case, whether or not a patent is to be filed, the Foundation may arrange for the invention to be described in a printed publication.

The Foundation requires that this grant be administered in general accordance with the Foundation's policies for research grants as stated in "Grants for Scientific Research," January 1960, as amended, and in conformity with the other understandings reached between the Foundation and the grantee relating to this grant.

Please acknowledge receipt and acceptance of this grant and include a reference to the grant number.

Sincerely yours,



Alan T. Waterman  
Director

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

December 8, 1962.

SCHOOL OF MATHEMATICS

Dr. R. Oppenheimer  
I. A. S.

Dear Robert,

As I am planning to leave Princeton soon after the end of the term, it becomes important for me to know how things will be arranged after that.

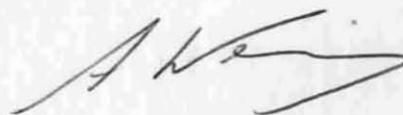
On October 11, you informed me that the Board of Trustees had given approval to my leave of absence for the second term; and a postscript stated that the vote was for leave without pay, but that you were given permission to make arrangements so that I should suffer no loss of income. On the other hand, Dr. Arthur Grad, of the N.S.F., had written as follows on September 10, in answer to an informal inquiry made by Deane on my behalf: "We will naturally make a grant for support of Weil in the amount requested; because of pressure of other business we have not yet sent this one through, but you can assure him informally that the grant will be made". This seemed definite enough; but apparently nothing further has been heard from them.

So it seems that concrete plans have to be made for each one of the following possibilities: (a) if the N.S.F. contract comes through before the end of 1962; (b) if it comes through some time after that; (c) if it does not come through at all. Perhaps the probability for (a) is fairly small by now; and, in view of the above quoted letter, one might think that the probability for (c) is also small. Still, all three cases have to be considered. Of course, in all cases, it is not only the question of my salary which arises, but also the question of the Institute's contribution towards my pension fund.

I am leaving to-day for Cambridge for a few days, but it would greatly help to set my mind at rest if you could let me know your intentions in these matters soon after that.

With best thanks for the steps you have already taken in favor of my leave of absence

Sincerely yours



A. Weil

Fac Weil

7 December 1962

Dear André:

Yesterday I called the Science Foundation, and found that all the decisions about your grant have at last been taken, and that the decisions are affirmative. The papers have now been forwarded to an office somewhat misleadingly called the Activation Office, from which formal notice should finally emerge in six or so weeks.

Robert Oppenheimer

Professor A. Weil

RO called Grad 12/6/62, spoke with Dr. Owen.  
Owen said that they had moved it into their  
activation office, and that we would be  
receiving the money in 6 weeks.

Dr. Oppenheimer:

Prof. Weil called to say that he had just received your note in the mail. Since he wrote this letter before receiving your note, he asked that I say this letter is now unnecessary. He is leaving for lectures at Cambridge and will be back at the end of next week.

J

Fac Weil

11 October 1962

Dear Professor Weil:

At a meeting of the Board of Trustees of the Institute for Advanced Study on October 9, 1962, the Board gave formal approval to your leave of absence for the second term of the academic year 1962-1963.

With good wishes,

Robert Oppenheimer

Professor A. Weil  
The Institute for Advanced Study

P.S. The Board's vote was for a leave of absence without pay, but I was given permission to make any financial arrangements necessary so that you would suffer no loss of income.

Fac Weil

Prof. Weil called 10/3/62

He said that Prof. Montgomery had had occasion to make a personal enquiry about the NSF application, and had received firm assurance that it will go through. Delay is administrative.

Weil said to tell you that as far as the Paris Institute goes, he had given them a definite acceptance.

He asked whether there was any further formality, and I said that you would be informing the Trustees.

*Fae Weil*

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

July 26, 1962.

SCHOOL OF MATHEMATICS

Dr. R. Oppenheimer  
Institute for Advanced Study  
Princeton, N.J.

Dear Robert:

Best thanks for your letter of June 25. Apparently you have not yet heard from the NSF about me (since otherwise I should have heard from you, or from your office), but I am sure there is nothing to worry about. Anyway, I have made my arrangements on the basis of your advice, i.e. on the assumption that everything will go through.

Since our two daughters will stay behind in Paris, and my wife has to make provisions for them in various ways, she cannot leave Paris earlier than September 26. I am not quite sure whether this is not slightly later than the official date of reopening of the Institute this year. However, I presume that my coming back only on the 26th is not likely to create any major disturbance, and I have consequently made reservations, for my wife and for myself, for that date. I could still arrange to come earlier, if it is your opinion that I had better do so. If I don't hear from you about this, I shall be there on the 26th.

*Term opens Oct 1.*

Probably this will not find you in Princeton, but I have no doubt that it will either follow you or otherwise be taken care of.

With good wishes for your summer,

Yours sincerely

A. Weil

*copy sent Ro 7/30*

Fac - Weil

25 June 1962

Dear André:

Thank you for your letter of June 19th.

After we submitted our letter to Dr. Grad, we were asked for a few formal attachments, i.e. budget, and in the course of this received all in the way of informal assurances that we could wish to the effect that the request would be granted. We have no formal answer.

Should this request not be granted, I will go before the trustees at their next meeting, and strongly recommend that the Institute give you that part of your salary which is needed so that the Paris sojourn will be on a no loss basis for you. I believe that the trustees will approve, and I would encourage you to make your plans on that assumption. I do not need to add that I cannot speak for them, but only to them.

If we hear from NSF in the near future, we will let you know by cable.

With good wishes for your summer,

Robert Oppenheimer

Professor A. Weil  
3 rue Auguste-Comte  
Paris (6e)  
France

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY

3 rue Auguste-Comte, Paris (6e)

June 19, 1962.

SCHOOL OF MATHEMATICS

Dr. R. Oppenheimer  
Institute for Advanced Study  
Princeton, N.J.

Dear Robert:

I am grateful for your letter of May 3 to Dr. Grad (of the NSF), a copy of which you sent to me at the time.

There is of course nothing surprising in the fact that there has not been as yet any official response to that letter. Of course it is my fault that I thought of this project so late in the year; had the idea occurred to me earlier, things would probably have been settled long ago. However, there are several problems connected with my intended stay in Paris (from January to June 1963) where I shall have to make a decision fairly soon: it is not only that the Institut des Hautes Etudes Scientifiques has indicated that they would prefer to have my answer to their invitation fairly soon; but, above all, there are problems concerning the schooling of my younger daughter, which (things being what they are in the French Lycées) cannot wait much longer.

I should therefore be very much obliged if you could give me some advice, and let me know whether you consider it safe for me to make final plans for the coming year on the assumption that I shall be able to spend the period in question in Paris. As I understood from our last conversation in April, you suggested that the Institute could perhaps consider financing the whole project (by paying the difference between my normal salary and what the Paris Institut has offered me) in case the NSF were not willing to come through with a contract. If this is still your view of the matter, I might perhaps go ahead with my plans without waiting for the official answer from the NSF. On the other hand, you may perhaps be in a position to get some definite assurances from the NSF, even though formalities may not yet be complete. Anyway, I shall have to make some decisions in the next 2 or 3 weeks, which will necessarily depend on your advice.

With apologies for having to trouble you about this during the Summer vacations, and with best thanks for your cooperation in this project of mine

Yours sincerely



A. Weil

June 13, 1962

Professor André Weil  
The Institute for Advanced Study

Dear Professor Weil:

Dr. Oppenheimer has asked me to write you about your pension arrangements. At the meeting of the Board of Trustees held in Princeton on April 6 and 7, the Board voted to increase faculty salaries to \$25,000 and increase the minimum guaranteed pension through TIAA-CREF to \$15,000.

The standard 5% contribution by the professor matched by a 5% contribution by the Institute for the balance of your tenure as an active professor will not produce the minimum guarantee, and the Institute is therefore adding \$294.77 to the monthly payments in your behalf to TIAA-CREF. Previous additional payments on your policy were \$31.60 per month.

You should know also that the Major Medical contract with TIAA has been modified to reduce the deductible after Blue Cross from \$200 to \$100.

Cordially yours,

Minot C. Morgan, Jr.  
General Manager

MCM: lw

Fac Weil

9 May 1962

Dear Dr. Grad:

At your suggestion, we are sending you the budget breakdown for our application to the Science Foundation for a grant for Professor André Weil. We submit this as an attachment to the application which you already have in twenty copies, a further copy of which is enclosed for identification.

Please let us know if any further information would be helpful.

Very sincerely,

Robert Oppenheimer

Dr. Arthur Grad  
Program Director for Mathematical Sciences  
National Science Foundation  
Washington 25, D. C.

THE INSTITUTE FOR ADVANCED STUDY  
Princeton, New Jersey

Office of the Director

3 May 1962

Dear Dr. Grad:

The Institute for Advanced Study asks the National Science Foundation for a grant for André Weil, who is a professor in the School of Mathematics at this Institute.

Professor Weil hopes to spend the period from January 1, 1963 until June 30, 1963 at the Institut de Hautes Études Scientifiques in Paris. His own account of the principal reasons for this project reads:

"Quite recently, my work on the arithmetical aspects of the theory of algebraic groups has taken a turn where it appears most desirable that I should spend the second term of next year (January to June 1963) in Paris. This is largely because of my wish to be close to Dieudonné, at the Paris Institut, and because the well-known young Japanese mathematician I. Satake, who has recently been doing first-rate work in that field, will be spending at the Paris Institut the whole of the academic year 1962-63. Of course the presence in Paris of Henri Cartan, Chevalley, Serre, Grothendieck will be a strong contributory factor, and I can expect much help in my work from close contacts with them over a reasonably long period, since my present work involves a number of different aspects of group-theory in which each one of them has a great deal to offer."

The sum of \$7,500 would be adequate to meet the expenses of his travel and his sojourn; the Institute would obviously waive all overhead.

We would be glad to recast this application in another form if that would be helpful to you, or to its success.

With good wishes,

Robert Oppenheimer

Dr. Arthur Grad  
Program Director for Mathematical Sciences  
National Science Foundation  
Washington 25, D.C.

Saw P. An. 1/59

THE INSTITUTE FOR ADVANCED STUDY  
Princeton, New Jersey

Office of the Director

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Dr. Arthur Grad  
Program Director for Mathematical Sciences  
National Science Foundation  
Washington 25, D.C.

20 copies (2 signed) to NSF  
1 " to Prof Weil. in Paris

THE INSTITUTE FOR ADVANCED STUDY  
Princeton, New Jersey

Office of the Director

3 May 1962

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Program Director for Mathematical Sciences  
National Science Foundation  
Washington 25, D.C.

THE INSTITUTE FOR ADVANCED STUDY  
Princeton, New Jersey

Office of the Director

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The sum of \$7,500 would be adequate to meet the expenses of his travel and his sojourn; the Institute would obviously waive all overhead.

We would be glad to recast this application in another form if that would be helpful to you, or to its success.

With good wishes,

Robert Oppenheimer

Dr. Arthur Grad  
Program Director for Mathematical Sciences  
National Science Foundation  
Washington 25, D.C.

D R A F T

Dear Dr. Grad:

The Institute for Advanced Study asks the National Science Foundation for a grant for Armand Borel, who is a professor in the School of Mathematics at this Institute.

*College de France*  
Professor Borel hopes to spend the period from January 1964 to June, 1964 at the Sorbonne in Paris. His own account of the principal reasons for this project reads:

"My main field of work at present is what may be called the arithmetic theory of algebraic groups, as described in my Stockholm address, which aims at studying systematically certain discrete subgroups of algebraic groups, called arithmetic groups, so as to develop a framework in which certain parts of classical mathematics, like the theory of automorphic functions or of quadratic forms, and their inter-relations, would find a natural place. Various aspects of this program arouse much interest in Paris, and my interest in going there is twofold. On the one hand, I would appreciate giving a regular set of lectures to a no-doubt interested audience, on the other hand, I would benefit from prolonged contacts with several mathematicians there, notably Godement, Grothendieck, Chevalley, Cartan, Serre (with whom I have in fact a joint work in progress). Godement has been interested for a long time in the more analytical aspects of these questions, and Serre is now lecturing at the College on some of the more algebraic sides of these problems. Grothendieck has recently proved theorems on algebraic groups by means of his theory of schemes, and I believe that the latter will be an important tool in studying algebraic groups over function fields."

The sum of \$7,500 would be adequate to meet the expenses of his travel and his sojourn; the Institute would obviously waive all overhead.

*No*  
*for him & his family;*  
We would be glad to recast this application in another form if that would be helpful to you, or to its success.

With good wishes,

Robert Oppenheimer

Dr. Arthur Grad  
Program Director for Mathematical Sciences  
National Science Foundation  
Washington 25, D.C.

Fac Weil

THE INSTITUTE FOR ADVANCED STUDY  
PRINCETON, NEW JERSEY

April 27, 1962.

SCHOOL OF MATHEMATICS

Dr.R.Oppenheimer  
I.A.S.

Dear Dr.Oppenheimer:

This is to confirm our conversation of yesterday, in which I informed you that I had received an invitation from the Institut des Hautes Etudes Scientifiques in Paris, to stay with them from January to June 1963, and that it is my wish to accept this invitation if I can arrange to do this without financial loss.

The scientific reasons for this were stated as follows, in a letter of informal inquiry which I recently addressed to Dr.A.Grad, of the NSF, in order to ascertain the chances of their giving some support to this project:

"Quite recently, my work on the arithmetical aspects of the theory of algebraic groups has taken a turn where it appears most desirable that I should spend the second term of next year (January to June 1963) in Paris. This is largely because of my wish to be close to Dieudonné, at the Paris Institut, and because the well-known young Japanese mathematician I. Satake, who has recently been doing first-rate work in that field, will be spending at the Paris Institut the whole of the academic year 1962-63. Of course the presence in Paris of Henri Cartan, Chevalley, Serre, Grothendieck will be a strong contributory factor, and I can expect much help in my work from close contacts with them over a reasonably long period, since my present work involves a number of different aspects of group-theory in which each one of them has a great deal to offer."

The financial aspect is as follows. The IHES is offering NF 5,000.00 per month from January to March, and NF 3,500.00 per month from April to June; in all, this represents a little more than \$ 5,000, i.e. somewhat less than the half of my regular salary for that period. As I just mentioned, I have already been in touch with Dr.A.Grad and also with Dr.H.Kelly, of the NSF; the latter has also been contacted by Prof.M.Morse, and these preliminary contacts have been definitely encouraging. Presumably a formal application would now have to be prepared. I shall be most grateful for any help from you in this matter.

Sincerely yours

A. Weil

The Institute for Advanced Study  
Princeton, New Jersey

Proposal to the National Science Foundation  
for a grant for Professor André Weil

BUDGET

Salary - 6 months, January 1 to June 30, 1963	\$7,000.*
Travel - New York to Paris and return	500.
Overhead	0.
	<hr/>
Total	\$7,500.

\* Equal to 56 per cent of Professor Weil's salary  
for the corresponding period at the Institute for  
Advanced Study

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Princeton, New Jersey

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Salary - 6 months, January 1 to June 30, 1963	\$7,000.*	7,000
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Overhead	0.	
	<hr/>	
Total	\$7,500.	

\* Equal to <sup>60</sup>56 per cent of Professor Weil's salary  
for the corresponding period at the Institute for  
Advanced Study

20 copies to Science Foundation  
1 to Whitney

February 16, 1962

To: The Faculty

From: A. Beurling, A. Borel, D. Montgomery, M. Morse, A. Selberg, A. Weil

As far as any one of us can remember, we have been guided primarily by the rule of always making the best choices we knew how to make from among our fellow-mathematicians. None of us has ever been aware of any agreement or tradition that could validly interfere with this cardinal principle.

Nothing could be more fatal to us than any visible departure from it; it is largely because we have followed it consistently, and because this has been widely understood and acknowledged, that the Institute has achieved its unique position in the mathematical world.

On the present occasion, we have been gratified to find that this policy has led us to give recognition to the increasing stature of the American mathematical school, which the Institute has in no small way helped to develop.

We do not wish to dictate policy to other groups at the Institute. At the same time, we greatly fear that any attempt to interfere with this principle of ours, on grounds of expediency and appeasement, would have the most serious consequences for us and for the Institute as a whole.

Professors    Alföldi  
              Cherniss  
              Dyson  
              Gödel  
              Kantorowicz  
              Lee  
              Meiss  
              Meritt  
              Oppenheimer  
              Pais  
              Panofsky  
              Strömberg  
              Thompson  
              Whitney  
              Yang

For: Weil  
c/r New Lib  
(Harrison & Abramson)

c/r Fac: Lib Comm.

15 May 1961

Dear André:

Thank you for your Tokyo letter of May 7th. Your impressions of the turn of mathematics in Japan are sadly in agreement with my impressions with regard to physics.

This is not the ideal moment to report on the library; but what with your travels and mine, I shall at least try to set down what has happened.

About a month ago we started over again with Mr. Harrison, and this time I can assure you, because I participated, that we started from the inside out. The resulting general layout did justice to the desire to have as much as possible on one floor, without vertical travel; to have adequate space for at least 150,000 books; and in other respects to conform, as far as possible in a Euclidian 2 space, to having almost everything immediately adjacent to almost everything else. In its first edition it was still very incomplete in two respects: it was not based on consistent and authoritative estimates of detailed space requirements for reading rooms, wall space, seminar rooms, etc., etc.; and it constituted a great, essentially rectangular chunk of architecturally hopeless character. To the first of these problems, we responded, about a fortnight ago, by clearing up the contradictory space requirements which Dudley had picked up here at one time or another, or which Judith had put down on paper. Judith, Harold Cherniss as the sole surviving member of the Library Committee, and I participated in writing out these requirements, which come to something between 20,000 and 25,000 square feet in toto. They have been built into the designs now being elaborated.

To the second problem Mr. Harrison has brought three devices.

1. The building as now contemplated has from the outside the appearance of seven units, each about 60 feet square, with flat prismatic roofs truncated by skylights. Four of these are disposed to cover the main upper level stack area, which is estimated to hold about 135,000 volumes, and the necessary areas for study and examination.
2. One, separated by a short, wide corridor from the stack, and to the west of the stack, is the mathematics wing, with reading room, periodical room, seminar room. The other two, to the north, and not aligned, together with a small excursion to the west, contain the rooms for the librarian and the library staff, and for the historians. Below a part of this area will

- 2 -

be a cellar for dead storage, for receiving, and for the mechanical services. Below the stack area will be an excavated, somewhat smaller than the upper level, stack, with daylight—though of course not so good as provided by the skylights above—for further future stack space of perhaps 70,000 or 80,000 volumes, to be held as reserve.

3. The mathematics wing and the main stack buildings are cantilevered slightly beyond the lower level, which adds further to the lightness of the structure. All of the square 60-foot elements are supported at corners only, so that there are few structural members and great flexibility in arrangement. Nevertheless, we are now engaged in making the best arrangement and assignment of the available space, and this week Judith will have some unlabeled drawings to play with, as well as the suggestions—good, but in my opinion not yet perfect—of Harrison and Abramovitz for the use of the space.

This library could perfectly well be built in brick with copper roofs, and thus deviate rather little from the style of the small buildings we now have.

It is clear that my first trip this summer will be to Mexico, and that I shall not be going to Europe until the autumn. Thus it is probable that we shall first see each other in Princeton next September.

With warm good wishes,

Robert Oppenheimer

Professor A. Weil  
Department of Mathematics  
Tokyo University  
Bunkyo-ku  
Tokyo  
Japan

cc: Professor Cherniss  
Professor Weiss  
Professor Thompson

This space is also for correspondence.

ここにも通信文を記載することができます

From: A. Weil  
Dept. of Mathematics  
Tokyo University  
Bunkyo-ku, Tokyo, Japan



Dr. R. Oppenheimer  
Institute for Advanced Study  
Princeton, N.J.

U.S.A.

PAR AVION  
航空

この郵便物には何物も封入又は添附できません  
Nothing may be contained in or attached to this letter.

折込線

折込線

ここにも通信文を記載することができます

This space is also for correspondence.

Tokyo, May 7, 1961.

*fr anand*

Dear Robert,

My wife has left me now to go back to Paris, and I am staying on until the end of May and giving lectures at Tokyo University; after that I shall join~~x~~ my family in Paris. We have been enjoying our trip to Japan very much; unfortunately, so far as Japanese mathematics are concerned, my impressions have been far less favorable than when I first visited Japan in 1955, and I do not feel too hopeful about the future. I will tell you more about it when I see you in the Fall (or perhaps earlier, if you come to Paris).

I am sure you have had much other business to think about, but I hope you will find some time to keep me informed about developments concerning our library building, as you did last year. I have no doubt that my colleagues on the Library committee would also wish to be kept informed: I am not sure about who is in Princeton now, and who is not, and I remember that Millard was going away, but he told me that he would leave a forwarding address, and that he would be very much interested to hear what was going on.

With best regards

Cordially yours



A.Weil

Fae Weil

Copies made for Fae.  
Judith  
Linder  
Hochschild  
Henry  
Greenbaum

copies filed in  
Inst Gen. Library  
discussions, etc.

26 May 1960

Dear André:

Many thanks for your good note from Pisa. You ask whether there have been new developments in the matter of the Institute library. Strictly speaking, I suppose there have been no new developments; but it seems to me that it might be helpful if I describe these absent developments in some detail. I hope that you will regard it as proper that I send copies of this letter to our colleagues; for most of them, their knowledge of these matters must be quite fragmentary. There are four headings.

1. As you know, the problem of the library was considered again by the Buildings and Grounds Committee of the Trustees prior to the Board meeting. At this meeting, the full record of our minutes, notes, addenda, letters, and so on, were set before them. Only in the case of Deane Montgomery's letter did I feel it necessary to read the letter to the full Board itself.

The Committee reported to the Board, recommending against reconsideration of the Board's action of April, 1959. The Board unanimously concurred, and instructed the Committee to proceed with architectural design that would be of some use in getting a building built from the inside out and not from the outside in.

2. At about this time, there occurred to me a vague architectural speculation, about which I have talked with the architects, and with Judith. What I would like to try is to build, above ground, a building, probably of two stories, fully adequate for the working spaces of historians and librarians for the quarter of a century for which we have agreed to plan, and conforming as closely as we can with Judith's ideas. I would like to build next to this, sharing a common corner, perhaps united by a covered terrace, a smaller building, probably one story high. This building should, according to our present plans, be designed to provide good offices for members of the Institute who wish to be close to the historical collections. At the same time, it should be adaptable to conversion to the reading and seminar rooms which the mathematicians and physicists may eventually wish to have there. This flexibility may be difficult; but I do not believe so. No provision

- 2 -

should be made for librarians' offices in this smaller building. Under both buildings there should be provision for continuous banks of stacks.

I believe that this scheme may provide a good solution, whether the library remains permanently restricted to the historical collections, or whether, as the Trustees anticipate, it ultimately becomes a pair of libraries for the whole Institute. I think that the departmental character of the smaller library will be easy to express, functionally and architecturally.

3. The Buildings and Grounds Committee, after initially favoring, finally rejected my suggestion that we employ Kassler to design the building. Their grounds for this lay principally in the rather meager and unimpressive record of his earlier designs. They instructed me to terminate relations with all earlier architects, and to seek to employ Harrison and Abramovitz as our architects. I talked to Mr. Harrison, who is a friend of many years, and he agreed to undertake the design, in part, I believe, because I emphasized the difficulty of a good solution. As you know, he is the architect of Radio City and the U.N. in New York, and is now working on the new opera house, and on the new law school and law library at Columbia University. I believe that we shall have some delay because of the many preoccupations of this office; but I hope that it will be worth it.

As for Kassler, I regretted very much not working with him. I have heard, in the last days, that he is desperately ill; and in practical terms the decision might well have been made for us by that.

4. About a month ago, a Dr. Matthew Gaffney of the National Science Foundation came to see me. He had heard from a colleague of ours that the Institute was not too well off financially; and that one way that we would welcome help was in financial help for a library.

The Science Foundation has never given money to help build a library. They now have one application, from Brown University, for a seminar library in biology; and Dr. Gaffney, and possibly others on the staff of the Foundation, think that it would be a good idea if they could extend their activities to supporting the construction

- 3 -

of libraries. They intend in no case to contribute more than fifty percent of the cost of a library. They have neither legislative approval nor a policy making decision to embark on this course; it is being discussed by the staff.

I explained to Dr. Gaffney that only about a half of the Institute's requirements for a library were generated by work supported by the Foundation. This seems to me true even if we include the marginal items of the history of science, and certain parts of archaeology. Nevertheless, Gaffney asked me to prepare a draft application, to see what it looked like. I have not submitted this application to the Foundation, and am not certain that I should do so; but I have sent the draft to Gaffney for his comments, advice, and preliminary exploration.

Clearly, it would be a help to have half the cost of the library borne by outside funds. I, myself, rate very low the prospects that the Foundation will do this, given the novelty of the undertaking, and the special character of the Institute's problem. I am also aware that if we represent this library, as the Trustees have decided, as eventually destined to serve the entire Institute, we have complicated our freedom of choice as to what we actually do with the mathematical collections. For these reasons, I do not propose to take definite action without much further consultation and deliberation.

Next month I am supposed to be in Paris, Berlin and Vienna. I have found it hard to make firm plans; but will surely write to you again if I am to be in Paris.

With good wishes,

Robert Oppenheimer

Professor A. Weil  
3 rue Auguste-Comte  
Paris 6e  
France

C O P Y

C O P Y

THE INSTITUTE FOR ADVANCED STUDY  
Princeton, New Jersey

Office of the Director

26 May 1960

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3. The Buildings and Grounds Committee, after initially favoring, finally rejected my suggestion that we employ Kassler to design the building. Their grounds for this lay principally in the rather meager and unimpressive record of his earlier designs. They instructed me to terminate relations with all earlier architects, and to seek to employ Harrison and Abramovitz as our architects. I talked to Mr. Harrison, who is a friend of many years, and he agreed to undertake the design, in part, I believe, because I emphasized the difficulty of a good solution. As you know, he is the architect of Radio City and the U.N. in New York, and is now working on the new opera house, and on the new law school and law library at Columbia University. I believe that we shall have some delay because of the many preoccupations of this office; but I hope that it will be worth it.

As for Kassler, I regretted very much not working with him. I have heard, in the last days, that he is desperately ill; and in practical terms the decision might well have been made for us by that.

4. About a month ago, a Dr. Matthew Gaffney of the National Science Foundation came to see me. He had heard from a colleague of ours that the Institute was not too well off financially; and that one way that we would welcome help was in financial help for a library.

The Science Foundation has never given money to help build a library. They now have one application, from Brown University, for a seminar library in biology; and Dr. Gaffney, and possibly others on the staff of the Foundation, think that it would be a good idea if they could extend their activities to supporting the construction

- 3 -

of libraries. They intend in no case to contribute more than fifty percent of the cost of a library. They have neither legislative approval nor a policy making decision to embark on this course; it is being discussed by the staff.

I explained to Dr. Gaffney that only about a half of the Institute's requirements for a library were generated by work supported by the Foundation. This seems to me true even if we include the marginal items of the history of science, and certain parts of archaeology. Nevertheless, Gaffney asked me to prepare a draft application, to see what it looked like. I have not submitted this application to the Foundation, and am not certain that I should do so; but I have sent the draft to Gaffney for his comments, advice, and preliminary exploration.

Clearly, it would be a help to have half the cost of the library borne by outside funds. I, myself, rate very low the prospects that the Foundation will do this, given the novelty of the undertaking, and the special character of the Institute's problem. I am also aware that if we represent this library, as the Trustees have decided, as eventually destined to serve the entire Institute, we have complicated our freedom of choice as to what we actually do with the mathematical collections. For these reasons, I do not propose to take definite action without much further consultation and deliberation.

Next month I am supposed to be in Paris, Berlin and Vienna. I have found it hard to make firm plans; but will surely write to you again if I am to be in Paris.

With good wishes,

/s/ Robert

Robert Oppenheimer

Professor André Weil  
3 rue Auguste-Comte  
Paris 6e  
France

Fac Weil

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March 22, 1960

Dear Dr. Oppenheimer:

I should be grateful if you would submit in my name the following views to the Buildings and Grounds Committee for their consideration:

1. Careful technical studies carried out this winter by our librarian show conclusively that the requirements of the two schools concerning their libraries are so essentially different that these cannot be met conveniently within one and the same building without a vast increase in outlay and cost.

2. If it is decided, nevertheless, to have a unified building for the combined libraries, then it seems important to have this done in a central location. To my mind, the least unsatisfactory attempt by far at a solution of this problem has been the one embodied in the Kassler plan. This, in its present form, is still liable to several serious objections, which further study could presumably remove; but it suffers chiefly from the unavoidable defects of an underground building with restricted daylight, and the no less serious and unavoidable handicap of a Southern exposure for the reading and working area, or the greater part of it.

3. Statistical estimates provided by the librarian show that the Kassler plan, in its present form, is quantitatively inadequate in several important respects. This is so, even if the rather conservative estimates made last year for the rate of growth of the libraries in the next twenty years are strictly adhered to; if not, and particularly if the Institute should venture into new fields during that period, the inadequacy would become far more acute. This means that final plans would have to be much more costly than is indicated by present estimates.

4. As a solution, satisfactory to both schools, cannot be achieved within a unified building except at great cost, it seems time now to explore alternatives. The really urgent need is at present for a library for the School of Historical Studies, which should be tailored primarily to the requirements of that school. The librarian's studies show that her staff would have to go into the same building. As to the library of the School of Mathematics, it is largely self-servicing, so far as its actual operation is concerned (as distinct from the ordering and buying of books which would of course remain in the hands of the librarian); it needs no more than one part-time worker. There

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2 -- R. Oppenheimer  
March 22, 1960

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is no difficulty in leaving it where it is (subject to some readjustment in order to convert the large reading room into a common room); this is likely to remain satisfactory for perhaps ten years or more.

5. Eventually it will become desirable to find another location for the library of the School of Mathematics. One should then give full consideration to the very real need of the mathematicians for a convenient seminar room close to their library (a need not provided for in the Kassler scheme).

6. If I had to make some suggestion concerning a possible location for the library of the School of Historical Studies, I should feel inclined to agree with what I understand to be Professor Kennan's view, in favor of the present parking lot near Building B. As for the far less urgent problem of a mathematics building, I should suggest the parking lot near Building A; other generally satisfactory solutions may possibly present themselves before the problem becomes acute.

I am greatly indebted to Miss Sachs, our librarian, for the technical and statistical estimates on which I have based the above conclusions. Those estimates can be communicated to the Buildings and Grounds Committee at any time this is desired.

Sincerely yours,

AW:MMM

A. Weil

cc: Faculty  
Miss Sachs

Fac Weil  
May 21, 1960

UNIVERSITÀ DI PISA  
ISTITUTO MATEMATICO "LEONIDA TONELLI"

Dear Robert,

Best thanks for your letter, which reached me in Pisa, where I am giving a few lectures. I will be back in Paris early in June.

I heard from Borel that there have been some new developments in the matter of the Institute library. If you could find time to let me know something about them, I should be much interested.

Please let me know if you do come to Paris.

With best regards

Yours as ever



A. Weil

Annex C to the Draft Minutes of  
the Faculty Meeting, March 21, 1960

Professor Weil has asked that the following statement be added  
as an annex to the minutes of the faculty meeting.

" 1. Careful technical studies carried out this winter by our librarian show conclusively that the requirements of the two schools concerning their libraries are so essentially different that these cannot be met conveniently within one and the same building without a vast increase in outlay and cost.

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