

S. Dickstein

April 4, 1934

Dear Mr. Dickstein:

Thank you for your extremely kind note of April 3rd. I shall be in Washington Tuesday and shall call your office, as you suggest. Most of the day, however, I shall be attending the meeting of the Trustees of Howard University, of which I am Chairman; but I shall make every effort to see you before I leave Washington.

With warmest regards,

Very sincerely yours,

ABRAHAM FLEXNER

Honorable Samuel Dickstein
House of Representatives
Washington, D. C.

AF/MCE

April 2, 1934

Hon. Samuel Dickstein
The House of Representatives
Washington, D. C.

Dear Representative Dickstein:

I am going to be in Washington Monday
next (April 9) and I wonder whether I could see
you for a few moments in the course of the day.

I have an appointment late in the afternoon. Other-
wise, I am free.

With great respect,

Sincerely yours,

ABRAHAM FLEXNER

AF:ESB

R. B. Dillehunt

UNIVERSITY OF OREGON
MEDICAL SCHOOL

OFFICE OF THE DEAN

PORTLAND, OREGON.

April 5, 1933.

Mr. Abraham Flexner,
The Institute for Advanced Study,
100 East 42nd Street,
New York, N.Y.

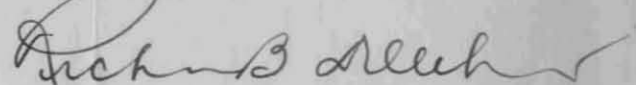
Dear Mr. Flexner:

I received the little bulletin No. 2 from the Institute for Advanced Study. I know that this enterprise will be one of great merit and accomplishment, because it is under your direction.

I frequently think of you and remember your many kindnesses which did so much to enable the creditable development of the University of Oregon Medical School.

With kindest personal regards,

Yours very truly,



Richard B. Dillehunt,
Dean.

RBD D

The non-Rack Research Laboratory
for Tuberculosis
46 Reed Street, Asheville, N. C.

June 23, 1930.

Dr. F. R. Sabin
The Rockefeller Institute,
New York, N.Y.

My dear Doctor Sabin:

I have seen your name among the trustees of the Institute for Advanced Study. I hope you will allow me to ask you for some information about how far have the plans for the organisation of the institution progressed. I would be interested to know whether there will be sections where perhaps I could find a new position. I believe I could find connections to several persons connected with this institution. I hope that you also will allow me to ask for your assistance. However I would not like to do anything in this matter while I do not know whether the institute might offer a possibility for me.

Eight years ago when I came to Asheville our laboratory seemed to offer me an excellent opportunity and I hoped that I will be able to develop it into a first class scientific institution. Circumstances however changed so that for lack of funds the laboratory cannot be maintained.

Yours very sincerely:

Louis Diener

July 1, 1930

Dr. Louis Dienes
The von Ruck Research Laboratory
46 Reed Street
Asheville, North Carolina

My dear Dr. Dienes:

Dr. Sabin has referred to me for reply your letter of the twenty-third of June. Nothing will be done towards the organization of the Institute for Advanced Study until the autumn, as Dr. Flexner, the Director, is now in Europe and will be occupied with other matters during the entire summer. I am sure that he will write to you as soon as possible after his return.

Very truly yours,

ESTHER S. BAILEY

Secretary

OBERLIN COLLEGE
OBERLIN, OHIO
THE COLLEGE OF ARTS AND SCIENCES

DEPARTMENT OF POLITICAL SCIENCE

Karl F. Geiser
Oscar Jászi
P. T. Fenn

July 1, 1930

Dr. Abraham Flexner
150 East 72. Street
New York City

My dear Dr. Flexner:

I was glad to read in the papers about your imposing plan to establish a new University on the basis of your own rich experiences and unrivaled criticism.

As the selection of your staff will be surely a difficult task, may I draw your attention on a friend of mine whom my uncle, the late Professor Leo Liebermann has regarded as the most hopeful of his students?

This is Professor L. Dienes who though a member of the Hungarian nobility could not stand the reactionary atmosphere of present day Budapest and is working since eight years in this country as director Von Ruck Research Laboratory for Tuberculosis.

I beg to enclose his personal data and the list of his main publications.

I am perfectly sure that your new Institution would find in him the ablest and most sympathetic co-worker.

With kind regards

Yours sincerely

Oscar Jászi

ack.
July 3
C.S.S.

Personal Data and Publications of Dr. L. Diénes,

Graduated as M.D. from the University of Budapest in 1908. From 1908 to 1921 was connected with the Department of Hygiene of the University of Budapest, being since 1915 Privat-Docent for Hygiene, and since 1918 Adjunct of the Department (Director of the Department, Prof. L. v. Liebermann). Also worked with Prof. Fr. Tangl in Budapest (General Pathology) and in Berlin with Prof. N. Zuntz (Tierphysiologisches Institut) and with Prof. N. Neufeld (Robert Koch Institut). Since early 1922 has been Director of the Von Ruck Research Laboratory for Tuberculosis, Asheville, N.C. In addition to Bacteriology and Immunology, in the first part of scientific career did considerable work in Biological Chemistry, being well acquainted especially with the microchemical analytical methods, and with Physical Chemistry. Has published 54 papers on experimental subjects, and besides these a number of papers in Hungarian, such as general reviews and discussions concerning subjects of general Hygiene. The following list contains the more important publications arranged according to the subjects:

Papers on Various Subjects of Bacteriology and Immunology

- Über Tiefenwirkung des Formaldehyds, Zeitschr. für Hygiene u. Infektionskrankheiten, 1912, V. 73.
- Das Weil - Felix-sche Bakterium, Deutsche Med. Wochenschrift, 1917 No. 13
- Die Abnormen Serumreaktionen bei Fleckfieber, Deutsche Med. Wochenschrift 1918 No. 17.
- Über das Vorkommen des Weil-Felixschen Bakteriums, Deutsche Med. Wochenschrift, 1919, No. 1.
- Abnorme Serum Reaktionen und die Weil Felix-sche Reaktionen, Zeitschr. f. Immunitätsforsch, 1919, V. 28.
- Bakteriologische Beobachtungen über Dysenterie. Feldärztliche Blätter 1917.
- Beobachtungen über das serologische Verhalten der giftarmen Dysenterie-stämme. Zeitschrift. Immunitätsforsch, 1919, V. 28.
- Über Paratyphus B. Infektionen, Zeitschr. für Hygiene u. Infektionskrankheiten, 1918, V. 87.
- Resistance to Tuberculous Infection of Guinea Pigs Rendered Skin Sensitive with Dead Tubercle Bacilli..Amer. Rev. of Tuberc. 1926, V. 13, p. 379
- Morphological Elements Present in the Tubercle Bacillus Cultures. Proc. Soc. Exp. Bio. and Med. 1927, V. 25, P. 216.

The Antigenic Substances of the Tubercle Bacillus

A Study of the Antigenic Properties of the Lipoids of the Tubercle Bacillus, Amer. Rev. of Tuberc. 1923, B. 8, p. 73

A Study of the Antigen Properties of Bacteria Giving Complement Fixation with Tuberculous Sera, Amer. Rev. of Tuberc. 1924, V. 9, p. 144.

The Chemical Composition and Antigenic Properties of the Tubercle Bacillus, Amer. Rev. Tuberc. 1925, V. 11, p. 151.

A Study of the Nature of the Specific Substances in Broth-Culture Filtrates of Tubercle Bacilli. Amer. Rev. of Tuberc. 1925, V. 11.

On the Specific Substances in the Alcohol Extract of the Bacillus of Tuberculosis, Jour. of Immunology, 1925, V. 10, p. 631. ,

The Specific Fraction of Alcohol-soluble Specific Substance of the Tubercle Bacillus. Proc. Soc. Exp. Biol. and Med., 1925, V. 23, p. 106

The Non-specific Activation in the Complement Fixation Test of the Alcohol-soluble Antigens of the Tubercle Bacillus. Jour. of Immunology 1926, V. 12, p. 123.

Non-specific Activation of the Alcohol-soluble Antigen of Tubercle Bacillus, Proc. Soc. Exp. Biol. and Med., 1926, V. 24, p. 25.

Antigenic Composition of the Watery Extract of the Tubercle Bacillus, Proc. Soc. Exp. Biol. and Med., 1927, V. 24,

The Antigenic Substances of the Tubercle Bacillus

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| 1. | Jour. of Immunology, | 1926, V. 12, p.137 |
| 2. | " " " | 1929, V. 17, p. 85 |
| 3. | " " " | 1929, V. 17, p. 157 |
| 4. | " " " | 1929, V. 17, p. 173 |
| 5. | " " " | 1930, V. 18, p. 285 |

Hypersensitiveness and the Influence of the Infection on the Immunity Response.

Local Hypersensitiveness in Tuberculous Guinea Pigs. Proc. Soc. Exp. Biol. and Med., 1926, V. 24, p. 32.

Local Hypersensitiveness	1.	Jour. of Immunology,	1927, V. 14, p. 9
	2.	" " "	1929 V. 14, p. 43
	3.	" " "	1929 V. 14, p. 53
	4.	" " "	1929 V. 14, p. 61

Further Observations Concerning the Sensitization of Tuberculous Guinea Pigs. Jour. of Immunology 1928, V. 15, p. 153.

The Immunological Significance of Tuberculous Tissue, Jour. of Immunology, 1928, V. 15, p. 141.

The Reproduction of Tuberculin Hypersensitiveness in Guinea Pigs, Amer. Rev. of Tuberc., 1929, V. 20, p. 92.

The Technic of Producing the Tuberculin Type of Sensitization with Eggwhite in Tuberculous Guineapigs, Jour. of Immunology. 1929, V. 17, p. 331.

The Specificity of the Tuberculin Type of Sensitiveness Produced with the Different Protein Substances of the Eggwhite, Jour. of Immunology. 1930, V. 18, p. 279.

Haemorrhagic Reactions in Tuberculous Lesions and Skin Tests during Protracted Anaphilactic Shock, Proceed. Soc. Biol. and Medicine. 1930, V. 27, p. 690.

Several of these papers were published together with my associates but I was the senior author of all.

PAPERS ON BIOCHEMICAL SUBJECTS

Zeigen die Blutkörperchen einer Blutkörperchen Aufschwemmung bei der Haemolyse mehrere individuelle Verschiedenheiten? Biochemische Zeitschrift. 1911, V. 33, p. 268.

Beitrag zur Kenntniss des Stoffwechsels in der Schwangerschaft und der Lactation, Biochemische Zeitschrift. 1913, V. 55, p. 124.

Über den Stickstoffansatz bei Fleisch und Mehlkost, Biochemische Zeitschrift, 1921, V. 123, p. 128.

Studien zur quantitativen Bestimmung sehr geringer Ca-, Mg- und P-Mengen in Tierischen Substanzen, Biochemische Zeitschrift, 1919, V. 95.

Further Studies on the Determination of Calcium, Magnesium, and Phosphorus in Animal Substances. Jour, Biol. Chemistry, 1924, V. 61, p. 77.

A Note on the Gravimetric Microchemical Technique, Jour. Biol. Chemistry, 1924, V. 61, p. 73.

Beside the papers published by me, ten papers were published by my associates under their name.

THE UNIVERSITY OF NORTH CAROLINA
CHAPEL HILL

OFFICE OF THE
DEAN OF ADMINISTRATION

November 4, 1940

My dear Dr. Aydelotte:

Thank you for your note about Abbé Dimnet. I will make inquiries
and if I get any information I will inform you also.

Cordially yours,

R. B. House

R. B. House
Dean of Administration

Dr. Frank Aydelotte
The Institute for Advanced Study
Princeton, New Jersey

RBH:FS

October 28, 1940

Dear Dean House:

Since receiving your letter of October 11th I have made inquiry of several people who I thought might know something of Abbe Dimnet, but none of them has elicited any definite information. One of our Institute members (a French mathematician) told me that he saw an item recently in the newspaper P.M. to the effect that a cablegram which had been sent to Abbe Dimnet at Paris had been returned. Someone suggested that it might be possible to get some information of him through his American publishers.

If I receive any more definite information I shall be happy to transmit it to you.

Yours sincerely,

FRANK AYDELOTTE

Dean R. B. House
University of North Carolina
Chapel Hill, North Carolina

FA/MCE

THE UNIVERSITY OF NORTH CAROLINA
CHAPEL HILL

OFFICE OF THE
DEAN OF ADMINISTRATION

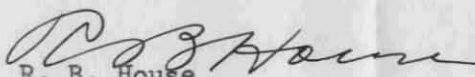
October 11, 1940

My dear Dr. Aydelotte:

Thank you for replying to my note about Leon Blum.

One of my favorite Frenchmen is Abbé Ernest Dimnet. I know him only from his writings but I certainly would like to know if he is alive, where he is, etc., just as a matter of personal information. Could you tell me?

Cordially yours,


R. B. House
Dean of Administration

Dr. Frank Aydelotte, Director
The Institute for Advanced Study
Princeton, New Jersey

RBH:FS



Mount St. Charles College

Helena, Montana

R. M. Dinkel

May 7, 1931

Mr. Abraham Flepner:
Care of The New Republic
42 West 21st Street
New York City.

Dear Mr. Flepner:

From The New Republic of March 4, 1931
I have learned that you are "to be the director of
an unusual institution of higher learning." One,
furthermore, for which "ample funds will be
available for scholarships." I would like to
apply for a scholarship.

My advanced study began with a year
of law at the Cleveland Law School of Baldwin
Wallace College. I had a scholastic average of
ninety-five per cent. I have a Bachelor of Arts
degree from the University of Notre Dame, graduating
in 1930 with maxima cum laude honors. My
major was economics and politics. In my
junior year I organized a discussion club
and participated in its weekly meetings. I
was a member of the varsity track team
and interhall basketball and baseball teams.
I earned two-thirds of all my expenses by
waiting on table and by serving as
secretary to one of the professors. The past
year I have taught American history,
politics, sociology, economics, and
economic history at Mount Saint Charles
College. I likewise coached the debating team.
Previous to entering Notre Dame, I worked
for over two years in the office of the
Cleveland Branch of the New York Life
Insurance Company as head cash-sheet
writer (bookkeeper).



Mount St. Charles College

Helena, Montana

I have wide and cultured interests. During the past school year, I have had subscriptions to the "New York Times", Daily and Sunday, The New Republic, Harpers, The Bookman, and Time. Some of the books I have read lately are: Spengler - Decline of the West, Frank - The Rediscovery of America, Sherman - An Contemporary Literature, Plato (Jowett) - Republic, Powers - The Art of Florence, Alessandro della Setta - Origin of Art, Mann - Magic Mountain, Melville - Moby Dick, Dostoevsky - Brothers Karamazov, Mac Knight Black Machinery, and Twentieth Century Poetry edited by Drinkwater, Canby, and Benet. I play the piano fairly well. I also hope to develop a deeper appreciation of other arts.

Personal data: age 23, height 6 ft.; weight 160 lbs.; Catholic; single; health excellent. I am enclosing a snapshot taken last year.

I would greatly appreciate your reply,

Sincerely yours,

Robert M. Linkel



May 12, 1931

Mr. Robert M. Dinkel
Mount St. Charles College
Helena, Montana

My dear Mr. Dinkel:

In the absence of Dr. Flexner, who is in England, I have received your letter of the seventh applying for a scholarship. As the Institute for Advanced Study has only recently been established, it will be a year or more before actual work starts. Indeed, the fields of study to be pursued have not yet been determined, nor have any decisions been reached regarding scholarships. I shall bring your letter to Dr. Flexner's attention upon his return, and I am sure he will be glad to communicate with you when the project develops. Under separate cover I am sending you Bulletin No. 1, which describes the organization and purpose of the Institute, and I am placing your name on the mailing list that you may receive future publications.

Very truly yours,

ESTHER S. BOULET
Assistant Secretary

September 3, 1938

Dear Dr. Dinkins:

I have your kind note of August 26, and I am glad to have a detailed account of your training and experience. Unfortunately, the Institute for Advanced Study is limited for the present to work in higher mathematics, archaeology, and economics. Within those fields it is able to offer opportunities, but there is no likelihood that its scope will be extended in the near future.

I am, with great regret and all good wishes,

Sincerely yours,

Dr. Pauline E. Dinkins
807 Minter Avenue
Selma, Alabama

ABRAHAM FLEXNER

AF:ESB

PAULINE E. DINKINS, M. D.

807 MINTER AVENUE

SELMA, ALABAMA

August 26, 1938.

Dr. G. Flexner,
Magnetawan, Ontario.
My dear Dr. Flexner:

It is kind of you to give heed to my desire to study in the Institute in which you are interested. I can not lay claim to being a person of exceptional ability. I only want to know.

Mrs. Lynum said that you asked her some questions about me which she could not answer. I am answering them. I acquired an A. B. degree from Hartshorn College, Richmond, Va. (This college is now merged with Virginia Union University.) My M. D. degree was given me by the Homan's Medical College of Pennsylvania in 1919. In 1928, I finished the course in tropical medicine at the London School of Hygiene and Tropical Medicine. Later, I worked as a missionary in Africa. I like medicine and literature.

PAULINE E. DINKINS, M. D.

807 MINTER AVENUE

SELMA, ALABAMA

I was born in Marion Alabama, Dec. 30, 1891. My high-school work was done in Selma, where I have lived since I was one year old. After college, I taught three years - mostly, languages. I have practiced medicine nineteen years.

I wonder why I am writing at length, in this way. After reading your bulletin, I began to fear that your Institute is for persons of extraordinary means and mind. At any rate, I thank you for sending the bulletin.

Very truly yours,
Pauline E. Dinkins.

d'Irsay

December 9, 1931

Dear Dr. d'Irsay:

I received yesterday your extremely interesting letter of November 25, and I was delighted to hear from you again. Since then I have been turning over the project in my mind. I feel sure that no one alive could carry it out at a higher level than you, and I am equally certain that it is a task that should be performed in a really scholarly fashion. On the other hand, at the moment the financial difficulties seem to me insuperable. The Trustees of this Institute have decided in view of the uncertain financial conditions to make no financial commitments, and this, I think, is prudent. When they do act, I feel sure that they will proceed very cautiously, confining their activities to one or two definite fields which they hope to cultivate with great intensity.

I have been now for over three years quite away from the foundations so that I am in no position to say whether or not your project would appeal to them. Private benefactors are so beset by demands for funds to provide food and clothing and rent that, as far as I know, it is impossible to approach any one for purposes of the kind you have in mind.

I am extremely sorry to make so discouraging a report, but I have never known America to be in any such financial depression as at the present.

With all good wishes,

Sincerely yours,

ABRAHAM FLEXNER

Dr. Stephen d'Irsay

Writing Room

Guaranty Trust Company of New York

4 Place de la Concorde

Paris

Nov. 25

My dear Mr. Flexner,

I hope you will permit me to write to you this letter, as concisely as possible in regard to an important problem. As you may know, I have transferred myself to Europe for the time being for various reasons, which we might discuss on some other occasion. The matter now is this:

I intend to write a comprehensive History of Universities. As you know, there is no book on this in any language; there is Rashdall, Denifle and Kaufmann for medieval universities only - and even they deal primarily with questions of organization rather than with Geistesgeschichte and the interrelations of University and Society; there are monographs but as I say, there is no comprehensive work.

I mention the following *Verarbeiten* that I have done already in this field: articles "Teaching and practice of medicine in the medieval univ. of Paris" (Bull. Chicago Soc. med. hist.); "Teaching and textbooks in the mediev. univ. of Paris", "Black death and medieval universities", "Gilles de Corbeil (Paris and Montpellier 1190-1210)" (Ann. med. hist.); Albr. v. Haller, Leipzig, Thieme, 1930 (Univ. Gottingen, Leiden etc. XVIIIth c.); Original connections betw. med. and univ. (J. Hopkins Bull.); Histoire internat. des universités (Bull. Detation Carnegie); courses Hist. of univ. (Hopkins); lectures Entwickl. d. med. Fakultät (Freiburg/Br.); Research in XVIIIth c. Public opinion in mediev. univ., Hist. of Quartier Latin (Chicago); First chairs of History (Intern. hist. congress Oslo); Univ. libraries of Germany (Hopkins) Les Victorins et l'hist. des sciences (Sec. études hist. Paris); etc. and the essays on the German university that you have seen.

As you see I have a good deal of material which I'd like to elaborate and put in book form. The sections would be these: Definition, philosophical principles; origins, the Schools Hellenistic anti-

monastic schools; Paris and theology with Philosophy; Bologna and the Law; Salerno and Montpellier and medicine; Greek learning in the West; characteristics of medieval universities and their expansion; German univv. in XIVth c., national movements (Prague etc.); univv. and territorial states; Humanism in Italy and academies of Florence, Rome, Naples; Humanism in France, Collège de France; Humanism in Germany and Spain (Strasbourg, Basle, Salamanca); Nationalism and Reformation (Wittenberg, Jena, Königsberg); Counter Reformation (Würzburg); univv. and scientific societies of XVIIth c.; experimental sciences in Padua, Pisa; exp. sciences and med. in Leiden, Edinburgh, Vienna; Research becomes a university factor, Göttingen; learning and enlightenment; the Napoleonic univ. system of France; Humboldt and Berlin; philos., religious and liter. movements in XIXth c. (Oxford; German romanticism; positivism Cousin, Guizot etc.); the scientific laboratory of the XIXth c. univ., Liebig, Virchow etc.; development of Amer. univv.; expansion of univ. activities, univ. and public; London, Columbia; post-war developments, Cologne, Hamburg, Soviet system.

I remark that the Oxford U. Press expressed interest and that I shall very probably begin a course here in Paris. Now, during the elaboration of a great many incidental studies will probably be forthcoming, biographical, in the hist. of science, bibliography; library study, Kulturpolitik etc. The main work - on account of the sources - would have to be done in Paris, London, Oxford, Rome, Göttingen and Leipzig. I should like to visit as many institutions as possible. - Knowing that you are deeply interested in the topic and in the hopes that you also have confidence in my ability to deal with it, I beg to ask you if it were possible to engage me on a salary of about \$4-5000 a year for the years 1932-34 for the purpose of completing and publishing this study. This sum would cover my living expenses as well as the travelling, copying, photographing of MSS etc. that such a work would imply. I do not know how far this scheme fits in with your plans or whether you can get hold of the funds; but I turn to you in remarking that I do not see any other way of completing this study.

I would of course report the various phases

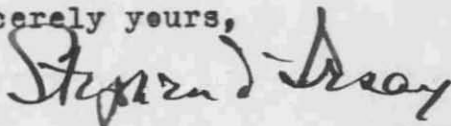
Writing Room

Guaranty Trust Company of New York
4 Place de la Concorde
Paris

as the work progresses. I do hope you will find this possible; there is really no foundation that would take ~~there~~ care of such a project, they all keep one on meagre salaries for very short periods and thus make large studies impossible; universities impose many other occupations, besides they allow travelling only throughout a short period of the year etc. But you know all this.

Please let me have your answer as soon as possible - I know that you will try at least something. I am very anxious to get this done.

Very sincerely yours,



Stephen d'Irsay , M.D.
F.R.H.S.

Dixon, Frank H.

January 21, 1935

Dear Professor Dixon:

I have no words in which to express how deeply I was touched by the joint letter which I received from you and your colleagues. Princeton has been inexpressibly kind and generous to us - both the University and the townsfolk. The letter which you and your colleagues have sent me shows, what indeed I already knew, that the economists and social scientists connected with Princeton University would coöperate with the Institute economists unselfishly and impersonally in trying to advance a study in which they all are profoundly interested and to which they have all devoted their lives. I have in my own mind no doubt whatsoever that we can repeat in the field of this thorny and difficult subject the experience, coöperation, helpfulness, and tolerance characteristic of the mathematicians in Fine Hall. It would not be possible to aim at a higher ideal, and we shall all be satisfied with nothing less.

With genuine gratitude and deep appreciation, I am

Very sincerely yours,

ABRAHAM FLEXNER

P. S. I am sending this letter separately to every one of the gentlemen who signed the letter to me.

A.F.

Professor Frank Haigh Dixon
Princeton University
Princeton, New Jersey

II - 12

February 13, 1939

Dear Professor Doan:

Thank you very much for your kindness in sending me a reprint of your paper entitled "Engineers as Leaders". I am greatly interested in the broadening of engineering work, precisely as I am interested in the broadening of all human interests. I believe that thus we gain both tolerance and insight.

With all good wishes,

Sincerely yours,

ABRAHAM FLEXNER

Professor Gilbert E. Doan
Lehigh University
Bethlehem, Pennsylvania

AF/MCE

from
G. E. Doan

Reprinted from the JOURNAL OF ENGINEERING EDUCATION,
Vol. XXIX, No. 4, December, 1938.
Printed in U. S. A.

ENGINEERS AS LEADERS

By GILBERT E. DOAN

Professor of Metallurgical Engineering, Lehigh University

A good deal has been written and spoken about broadening the engineers' curriculum without always making clear the objective behind this trend. It can, however, be stated in one sentence: To enable the student to extend the realistic approach of the engineer to the great majority of his future problems, that is, to those which border on or lie outside of engineering.

Almost all of us would agree that this realistic approach to social and individual problems is desirable. There is, however, a class which continually mistrusts the engineering approach and that is the one which includes the lawyers and economists. They are, as Professor Thurman Arnold of Yale calls them, the "high priests" of our present social cult, the one who argue in vague terms about abstract ideals and "isms" instead of coming to grips with the obvious needs of our country to-day to improve conditions on the farm, in the factory, and in the home. This group criticizes the engineer as one who seeks to "rigidify" any system or problem which he examines. We exclude all human and emotional factors from our calculations in social problems, they say, and strive to fit the situation into a concrete equation by excluding all non-quantitative factors, and then proceed to solve this equation and apply the solution to the group concerned as if they were guinea pigs.

The economists and lawyers do not realize that they themselves attempt to rigidify the recent past into a set of convenient generalizations, called economic and legal "principles," likewise rejecting any forces which do not fit into their theories, and then attempt to judge the present and predict the future on the basis of these selected and rigidified theories. The reason so many economists have been wrong in their predictions is that they too love to simplify their pictures by neglecting those facts that do not fit, such as "politics," and technological developments. That is why their predictions during the early years of the depression were so universally wrong. Most of them could, for example, have proved to you that Henry Ford was wrong in his early plans for wage raises. At about the same time Woodrow Wilson "proved" that the automobile would split democratic America into two social classes:

those who could afford cars and those who would have to take their dust.

Their mistakes do not excuse ours, however, and if we hope for the day when the engineering approach, that is the factual and realistic approach, shall extend to the larger and more complex problems before the country, then we must be prepared to turn out effectively prepared graduates who, in addition to the engineering habit of mind, shall have an awakened consciousness of the non-material forces which operate in their world. When an engineer, retained perhaps in a law case, listens to an impassioned plea for liberty by a lawyer or politician who is bent on greater liberties for a small group at the cost of liberty to millions of people, the engineer who is listening must be able to feel sure that he knows what liberty is, and to distinguish that part of the plea which is sound reasoning from the part which is superstition and drama. *He must not lose his effectiveness in the case when such values as liberty, drama, and superstition enter it.*

Stuart Chase may show stupendous wastage of national assets by soil erosion such as any engineer left to his own judgment would check immediately. But when soil conservation is labelled either "communism" or "bureaucracy," the engineer is scared off as by threat of a mysterious disease. Superstition paralyzes his rational action. Here again the engineer loses effectiveness as a social force at a time when his influence is most needed. Even if the job could be done free by using unemployed labor which had to be supported anyway, he would not feel sure of his program. In brief, when engineers are drawn into broad problems as they are to-day and will be increasingly, they must have an effective background of social philosophy or they will be relegated to the side lines to listen with awe and wonderment to the decisions of their "superior" colleagues.

This is the reason for the inclusion at M. I. T., Carnegie Tech., and California Tech. of required studies in history, philosophy, the social sciences, and literature. If the engineering approach to national problems is to fulfill its obvious mission in America, it must receive from the schools men firmly grounded both in science and the humanities, men with a balanced foundation and a broad and flexible approach to industrial problems.

Both experimental psychology and actual experience show that engineering training *associated* with the study of humanistic problems makes possible this balanced foundation, while the study of technologies for four years in a social vacuum followed by a sudden impact with the world of affairs results in an engineer who is timid and unsure whenever a large-scale project is discussed.

As engineer educators, we can well afford space in our curricula

for this bolstering of the humanitarian studies. The increasing vogue of post-graduate study in engineering, both at the university and in industry, is providing ample room for the more specialized technologies. As engineers, we can, however, ill afford to discourage and stunt the extension of the engineering method into the broader problems of to-day by turning out graduates who are unprepared to make this extension when it is called for. *The increasing domination of the engineering mind in the world's affairs is the manifest destiny of our chosen field if we but give our students the proper breadth of foundation to measure up to it.* Such a program should bring us an increase in numbers of high-grade students, more support both by endowment and by industrial influence, and higher respect in the general academic mind.

Our technical civilization will be led by the technically-ignorant lawyers and economists only so long as our engineers are not qualified to lead.

W. E. Dodd

October 15, 1935

Dear Ambassador Dodd:

I have your kind note of September 17, with reference to Professor Hoetsch, whom I remember meeting once in Paris a few years ago. I have made inquiry of Professor Wertenbaker, who tells me that at the moment there is nothing that he can offer. Inasmuch, however, as Dr. Hoetsch is going to be in New York, it may be that the Institute could invite him to come to Princeton before he goes to Chicago and offer him an honorarium of perhaps \$250 for one or two lectures. I realize that this is a very slight opportunity, but as a matter of fact we are doing nothing in his field at the present time, so that no funds have been set aside for work of this kind; but I think it not improbable that I can "wangle" it in some way or other. If this seems to be worth while let me know and at the same time give me some idea as to when it would be most convenient for him to come to Princeton.

I am glad that you did not hesitate to write me. I hope that you will feel free to do so at any time.

With all good wishes and very high regard,

Sincerely yours,

Ambassador William E. Dodd
c/o State Department
Washington, D. C.

ABRAHAM FLEXNER

AF/MCE

Please return to

A. Flexner

20 Nassau St.

Princeton



EMBASSY OF THE
UNITED STATES OF AMERICA

Berlin, September 17, 1935.

Dear Mr. Flexner:

I asked William, my son, to stop and speak with Professor Wertenbaker about the possibility of Dr. Otto Hoetzsch, of the University of Berlin, being engaged the next winter or spring quarter for some lectures on international problems. William was on his way to his position in Virginia. Dr. Hoetzsch, as you may know, is about the foremost international authority on the continent of Europe, certainly in Germany. His writings must be well known at Princeton, and I think the head of your International Institute is personally acquainted with him. Although he was one of the most popular teachers in Berlin and had just published two volumes on the Great War diplomacy, he was summarily dismissed on the first of last May without any cause having been given to him or announced to the public.

Dr. Hoetzsch speaks English so well that one hardly observes any difficulties at all; and I think his information is such that he could give an American university some very interesting lectures on the background of existing problems. It was for this reason that I asked William to explain Dr. Hoetzsch's position to Professor Wertenbaker, and I also asked him to explain the matter to you when you returned from your vacation. The President of the University of Chicago has asked me to offer Hoetzsch some opportunity of this sort there either for next winter or spring. Dr. Schmitt, chairman of the History Department at Chicago, will be here about the middle of November. If there is any opportunity at Princeton, I wish you would let me know so that Drs. Schmitt, Hoetzsch and myself may make definite arrangements. Perhaps it would be better for you to write me in care of State Department.

Sincerely yours,

Mr. Abraham Flexner,
Princeton University,
Princeton, N.J.

William E. Dodd

January 25, 1935

Dear Ambassador Dodd:

Returning to Princeton, I find your note of the twenty-first, which the Assistant Secretary had already answered in part.

I quite agree with you that if modern history were taught as men like you could teach it, the whole face of society would be changed, but, alas, how many people like you exist or can under present circumstances be attracted to the teaching profession!

It was a great pleasure to see you, and I hope that you will visit us again.

With all good wishes and profound gratitude,

Sincerely yours,

Honorable William E. Dodd ABRAHAM FLEXNER
Round Hill, Virginia

AF:ESB

January 24, 1935

Honorable William E. Dodd

Round Hill, Virginia

My dear Ambassador Dodd:

Your letter of January 21 to Dr. Flexner has come while he is absent from Princeton. He will write you promptly upon his return. In the meantime I am sending you the Institute's check for \$25.00 to reimburse you for your traveling expenses to Princeton and return.

Very truly yours,

ESTHER S. BAILEY

Assistant Secretary

ADDRESS OFFICIAL COMMUNICATIONS TO
THE SECRETARY OF STATE
WASHINGTON, D. C.



DEPARTMENT OF STATE

WASHINGTON

Round Hill, Va.

Jan 21, 1935

Dear Dr. Flanner: Thanks for your kind note. I hope no harm was done. My conviction is, and long has been, that if modern history were taught in schools and colleges as it actually transpired, wars would cease and co-operation would follow. Think of what young people in most European countries are brought up on!

I forgot to ask fare from Washington to Princeton and return. From here to W. and return is about \$5⁻ including incidentals. You can guess other items.

Yours William F. Dodd

6⁵⁰
RR 13.00
Chair 3.00
16.00
5.
+ 21.00
meals ?

January 17, 1935

Dear Ambassador Dodd:

I wish to thank you in writing for your admirable address last night. Already this morning I have heard from all sides an expression of the deepest appreciation. In the simplest and yet the most scholarly fashion you opened our eyes to conditions which even those of us who have enjoyed educational opportunities did not fully understand. As we drove home, my wife said, "Think of the interest in and knowledge of American history I might today possess, had I had a man like Professor Dodd as my teacher when I was at college."

I have told my secretary that she will shortly receive a note from you telling her the expenses you incurred in coming to Princeton. Please do not overlook this item.

In conclusion, let me express once more my gratitude and gratification and the hope that we may have frequent occasions to meet in the future.

With all good wishes,

Sincerely yours,

ABRAHAM FLEXNER

Hon. William E. Dodd
c/c State Department
Washington, D. C.

AF:ESB

December 5, 1934

Dear Ambassador Dodd:

Your letter of November 15 came at a time when President Dodds was not in Princeton and by the time he returned I was away for ten days, hence the delay in my reply. I saw him yesterday and showed him your letter. As to publicity, he made the point that, if no publicity was given to your address here, it would mean uncontrolled publicity, which might of course be unpleasant. The relations of the University and the Institute to the press representatives here is such that, if we give them a notice at any time, they will print exactly what we give them. We need do nothing therefore until you arrive in this country. We can then arrange some form of announcement that is perfectly agreeable to you and also agree upon the date when it is to be released.

We are all sorry that Mrs. Dodd will not come with you. In that event I can put you up for the night either at the Princeton Inn, where you would be perfectly comfortable and quiet, or at the Nassau Club, both being very close to the University. I hope to see you soon after your arrival in this country in order to work out any details and the way in which you wish them to be handled.

Not knowing the date of your sailing, I am sending a copy of this letter to you, in care of the State Department in Washington, to be held for you.

President Dodds is also writing to express his regret that he and Mrs. Dodds have been called out of town and will have to be in Minneapolis on the date

Ambassador Dodd

December 5, 1934

2

agreed for your address.

With all good wishes and high regard,

Very sincerely yours,

Honorable William E. Dodd
Embassy of the United States of America
Berlin, Germany

ABRAHAM FLEXNER

AF:HEB



EMBASSY OF THE
UNITED STATES OF AMERICA

Berlin, November 15, 1934.

Dear Dr. Flexner:

Many thanks for the cordial invitation which you wrote us on October 30. I think there will be nothing to prevent my appearing at Princeton on January 16. The State Department has given its consent to making an address on historical subjects. Since there may be some doubt as to my actual appearance, it may be well not to make announcements until arrival in New York. In fact, I would prefer that no publicity except in University circles be given to the matter. However, I do not make a definite condition. The reason is that so many other invitations came last year after it was known that I had made a public address in Richmond. I leave the matter therefore to you.

I am afraid my wife cannot accompany me, as I shall have to appear at the University of Cincinnati on the 18th and then go to Chicago to attend to certain matters there. Please thank President Dodds for his kindness and let him know that my wife thinks she can hardly accompany me on the journey.

Sincerely yours,

William F. Dodd

Dr. Abraham Flexner,
Institute for Advanced Study,
20 Nassau St.,
Princeton, N.J.

W. E. Dodd

October 30, 1934

Dear Ambassador Dodd:

I have your kind favor of October 13.

In order to avoid the examination period at Princeton University and the vacation period of the Institute, I suggest after conference with President Dodds the evening of January 13, 1935. The lecture will be given in McCormick Hall, and President Dodds suggests that you and your wife should be his guests at Prospect, inasmuch as Mrs. Flexner and I are not permanently settled. I shall be happy if you will let me know when I am free to make an announcement. I am certain that you will have a large, appreciative, and intelligent audience, and we shall deem it a great honor to have you with us.

Very sincerely yours,

Honorable William E. Dodd
Embassy of the United States of America
Berlin, Germany

ABRAHAM FLEXNER

AF:WES



EMBASSY OF THE
UNITED STATES OF AMERICA

Berlin, October 13, 1934.

Dear Dr. Flexner:

I must be in Washington on December 27,
but cannot say exactly when I shall be returning.
However, I expect that I would have to leave New
York around the 20th of January. In case the
University community is reassembled before the
20th, or 25th possibly, I shall be at your com-
mand and would use the subject which I gave you
in my note of some weeks ago.

Sincerely yours,

William E. Dodd

Dr. Abraham Flexner,
20 Nassau St.,
Princeton, N.J.

*Jan. 19th
15th*

W. E. Dodd

October 2, 1934

Dear Ambassador Dodd:

I am sorry to have been delayed in replying to your letter, which, of course, I shall keep both personal and confidential.

It goes without saying that we should be delighted if, in the event of your coming to America, you could address the instructors and advanced students of history and politics and others of the same calibre interested in your topic, The Function of History in our Troubled Age.

I would suggest the latest possible date rather than an earlier one, inasmuch as both the Institute for Advanced Study and the University begin to break up about the middle of December.

In case you can arrange to speak in Princeton, I should like your permission to mention the subject to President Dodds, so that we can cooperate in making your visit a success. I shall, of course, keep the whole matter absolutely confidential until you write me affirmatively.

I cannot but think that the sort of address you would make might prove enormously stimulating to those of us who are trying to find our way in the maze of politics and economics. As you well know, the government is exerting itself actively, but we have waited too long, and

Ambassador Dodd

October 2, 1934

- 2 -

great social and economic changes cannot be wrought over night.

I happened to be reading very recently your vigorous study of Lincoln and Lee - a lifelike portrait of two great men in an era that was also struggling to find itself.

With all good wishes and very high regard,

Sincerely yours,

ABRAHAM FLEXNER

Honorable William E. Dodd
Embassy of the United States of America
Berlin, Germany

AF/LCE

Let this be personal
and confidential

EMBASSY OF THE
UNITED STATES OF AMERICA

Sept. 11, 1934

Dear Mr. Flexner:

Following up the suggestions

of your letter of November^{last}, I am venturing to say that my plan contemplates a short sojourn in Washington the last of next December and the first half of January and that it may be possible for me to discuss with your advanced students the Function of History in our Troubled Age. Of course

I can not be sure now, but as I must write, if not deliver, the presidential address of the American Historical Assoc.

ciation about December 28, I hope the Extern-
ment will allow me the leave. And being
once on that side, I feel a little disposed
to contact with our University life again -
especially that of one of our greatest
presidents.

Think the matter over and see if
there is prospect that any good might
be done. I think, with you, our people have
never taken seriously the thorough work
in high schools and colleges as necessa-
ry if we are to find a way to escape
still further disaster from the follies
and egotisms of men who manage
to accumulate too great fortunes.

We have many rich men who have been generous and some who have seen the necessity of free thought and teaching, but not enough. The University, if college and high school do their work aright, is the great hope of the future in the British-American world. Able, unselfish scholars will show men how to make proper use of the discoveries and inventions of scientists.

But pardon so long a story. We are still in a busy world here - all people bankrupt and none knowing how to recover. I ventured a little of what seems to be the truth yesterday, on Sunday the 9th, at bankrupt Bremen. I suspect our papers will not stress the points that bear on the United States. Tell President Aydelotte that I was very sorry we missed seeing him when he was here.

Yours sincerely
William E. Dodd



W. E. Dodd

EMBASSY OF THE
UNITED STATES OF AMERICA

Berlin, December 13, 1933.

Dear Dr. Flexner:

I have delayed answering your letter of November 17 because of the press of affairs and the necessity of a short sojourn out of the city.

Your suggestion about the place that history ought to occupy in our university work is very much in accord with my efforts the last fifteen years at Chicago. Just as I received the appointment to this position, our Social Science group had decided to require from all under-graduates a course in history which should stress very effectively the great crises in modern history, concluding with the present. You may have gathered an inkling of what was to be offered from the re-print of my address before the Chamber of Commerce here. I was to have given the course this winter. The purpose was to give all young people who hoped to play a part in public life a real understanding (not mere conventional facts) of the decisive moments in modern history. I believe the course would have met at least a part of the need.

In our graduate work we have done something like this for a number of years, and I believe our doctors of philosophy now teaching in a hundred or more American institutions are really giving a new version of modern history. I only wish that there were means these troubled times for endowments of a few such chairs as I have suggested above - endowing them so heavily that the ablest young people would consider their occupancy as about the highest attainment possible. This might give us the teachers we need.

Sincerely yours,

Dr. Abraham Flexner,
Institute for Advanced Study,
20 Nassau Street,
Princeton, N.J.

William E. Dodd

November 17, 1933

Dear Ambassador Dodd:

I am very happy to have your kind note of October 31. Now that I have the School of Mathematics well under way, I am wondering whether a similar opportunity to deal fundamentally and thoroughly with politics, economics and history does not exist. It is a subject, regarding which you could advise me with great authority. If ever time hangs heavily on your hands, I should like a memorandum on the subject. I may say that, in such discussion as we have had within the Board, the importance of a thorough and sound historical approach has been emphasized, and this I should judge from your letter to be your own view.

With all good wishes and very high regard,

Sincerely yours,

ABRAHAM FLEXNER

Honorable William E. Dodd
Embassy of the United States of America
Berlin, Germany

AF:ESB

Dodd

October 14, 1933

Honorable W. E. Dodd
The American Embassy
Berlin, Germany

Dear Ambassador Dodd:

May I venture to congratulate you upon your weighty and brilliant address on the subject of Dictatorships? It has made a profound impression in the United States and proves quite conclusively that university professors may beat the diplomats at their own game, just as I suspect some of them might beat big business men if given the opportunity.

I am enclosing a copy of the Sunday Supplement of the New York Times, describing in a too journalistic manner this new Institute of ours. We are making a very inconspicuous beginning, betting on brains as against buildings, despite the emphasis which the author places on the beauties of Fine Hall. Some day I hope to welcome you here.

With all good wishes,

Sincerely yours,

ABRAHAM FLEXNER

AP:MSB

June 8, 1939

Dear Alfred:

I have your letter of June 5 in reference to Professor Einstein. Inasmuch as he is leaving very shortly for his summer vacation, I do not know whether or not this is a good moment at which to approach him. In any event, there is only one way to do so and that would be for you to write him. There is nothing that I myself can do in your behalf.

I saw you across the room at Mrs. Garrett's and hoped to have a few words with you before we dispersed, but Mrs. Bliss wished to see me and so I had to forego the pleasure of greeting other friends.

With all good wishes,

Sincerely yours,

ALBANY FLEXNER

Mr. Alfred R. L. Dohme
702 Baltimore Life Building
Baltimore, Maryland

AF/MCE

OFFICE OF
ALFRED R. L. DOHME
702 Baltimore Life Building

Baltimore, Md. June 5, 1939

My dear Abe:

As you may recall I have for some years past provided the necessary funds to arrange for visits to our graduate students at Johns Hopkins of eight of the leading Scientists to discuss with them their problems and give a lecture upon their own research problems. This was originally planned only for chemistry but in recent years I have extended it to chemistry physics, biology and mathematics.

The mathematical department would very much like to have for next year (date selected about January 26, 1940)

Prof. Albert Einstein to be one of the guests for that department, and I trust that you as a Hopkins Alumnus and classmate of the undersigned can persuade Prof. Einstein to do us the honor of visiting our University and spending a day with us here. If the Professor desires no undue attention or fuss made we can certainly arrange that.

There is a honorarium of one hundred dollars (\$100) for the visit which requires only one day arriving in the morning and leaving that evening if so desired by him.

Saw you for a moment recently at Mrs. John W. Garrett's musicale.

With kind regards

Yours sincerely



Dr. Abraham Flexner,
c/o Institute for Advanced Study,
Princeton, N.J.

December 30, 1938

Mr. J. E. Robbins
Dominion Bureau of Statistics
Ottawa, Canada

My dear Mr. Robbins:

We have your kind inquiry of December 28 and are happy to send you under separate cover a complete set of the bulletins thus far issued by the Institute for Advanced Study.

If after examining these bulletins you desire further information we will be happy to have you write us, and we will gladly answer any questions which you may wish to ask.

Very truly yours,

MARIE C. EICHELSEER

MCE

DEPARTMENT OF
TRADE AND COMMERCE



CANADA

ADDRESS ALL
COMMUNICATIONS TO
R. H. COATS
DOMINION STATISTICIAN
OTTAWA

DOMINION BUREAU OF STATISTICS

OTTAWA,

CANADA

December 28, 1938

Institute for Advanced Study,
Princeton University,
Princeton, New Jersey, U.S.A.

Gentlemen:

Could I have a copy of the last annual bulletin of the Institute for Advanced Study and any other available published data concerning it that would be useful to a joint committee of several Canadian national organizations in the field of the social (as distinct from natural) sciences that is making a survey of facilities in this country for advanced study and research.

Unique facilities such as the Institute represents, even though outside of our boundaries, obviously call for the committee's attention.

Yours very truly,

A handwritten signature in cursive script that reads "J. E. Robbins".

J. E. Robbins

January 11, 1940

Miss Elizabeth Dow
1028 Park Avenue
New York City

Dear Miss Dow:

Thank you for your note of the 10th.

I am so sorry that there has been an error in
your address. In our files it is given as
1028 Park Avenue, and we shall make sure that
this is emphasized if we have any requests for
your address.

Looking forward to seeing you in the
near future, I am

Sincerely yours,

RSB:MGH

ESTHER B. SAWLEY

1028 Park Avenue
New York
January 10, 1940

Dear Mrs. Bailey,

It has come to me from two
separate sources recently, that my
New York address has been given out
by the Institute as 128 Park Avenue.
I am sure this must be through some
mistake on my part. But I want you
to know the correct number so that
nothing more will go astray.

I hope to make a visit to Princeton
sometime soon and see you all.

With all best wishes.

Sincerely,
Elihu B. Shaw

1028 Park Avenue

New York City

October 3, 1939

Dear Mrs. Bailey,

Thank you so much for sending the check covering expenses of student help during the moving process. I was indeed sorry that I didn't see you again and that I had to ask Miss Cutter to discharge those little offices; that last Saturday morning flew by and was gone before I realized. I look forward to seeing you next time I am in Princeton, which probably won't be far hence.

I had a card from Dr. Lowe yesterday, to the effect that he has asked his new Research Assistant, Mrs. Cheever, to start work in Princeton immediately. He wished me to be on hand to introduce her to Dr. Flexner and to you, but I am having a very busy time with my own job and shan't be able to come to Princeton just now. I am sure you will be glad to meet her and give her any needed assistance and advice about places to live, etc. She may have the keys to the files if she needs them, but since the lower drawers, containing the photograph collection, don't lock anyway, she probably won't need them.- Dr. Lowe writes that he is well and safe.

With all best wishes,

Sincerely yours,

Eugene D. S.

September 14, 1939

Dear Miss Dow:

I have your note of the thirteenth,
and we shall be happy to see you on Monday morning.
However, our unit is moving out to Fuld Hall on
Saturday afternoon so that we shall be there instead
of at 20 Nassau Street.

Looking forward to seeing you, I am

Very sincerely yours,

ESTHER S. BAWLEY

Miss Elizabeth Dow
1028 Park Avenue
New York City

ESB

1028 Park Avenue

New York

September 13, 1939

Dear Mrs. Bailey,

Thank you so much for writing.
Since there are some things I want
to arrange before moving, I shall
plan to come to Princeton on Mon-
day and stay for as much of the
week as is necessary. Accordingly,
you can expect to see me at
headquarters at a fairly early Mon-
day morning.

I will be glad to see you again.

With all best wishes,

Yours sincerely,

Elizabeth Dow

September 11, 1939

Dear Miss Dow:

We now find that the moving of Professor Lowe's "scriptorium" from 150 Fitz Randolph Road to Fuld Hall will take place during the week of September 18-25. One moving company will take care of the moving of the various Institute groups, so that I cannot say now whether Professor Lowe's goods will be moved at the beginning of the week or later. It will be necessary to put tags showing where each piece is to go in Fuld Hall, so that I suggest you come to 20 Nassau Street to get the tags and the numbers of rooms in Professor Lowe's suite in Fuld Hall.

With all good wishes and kind regards,

Very sincerely yours,

Miss Elizabeth Dow
1026 Park Avenue
New York City

ESTHER S. BAILEY

August 16, 1939

Dear Miss Dow:

In a letter received recently from Professor Lowe, he mentions the fact that you will come to Princeton to supervise the moving of his books, etc. to Fuld Hall. This is just a note to tell you that Fuld Hall will not be ready until about the 10th of September, so that you need not expect a call from us before that date. We will let you know in good time when the things can be moved. In the meantime I am communicating with Professor Stace about leaving them at "150" until Fuld Hall is ready.

I hope you have had a good summer and that you are enjoying your new work.

Sincerely yours,

MARIE C. EICHELSER

Miss Elizabeth Dow
1028 Park Avenue
New York City
MCE

E. Dow

Cape Porpoise, Maine

June 18, 1937

Dear Mrs. Bailey:

I was very glad to hear from you, and especially to know that Miss Cutter found favor with the Institute. It will also be very nice for me to have her there.

Your letter anticipated my own intention of writing to you to let you know that I had accepted Dr. Lowe's offer. He wrote to me from Oxford that he was much pleased at my decision, and I myself feel that I am very fortunate to be connected both with him and with the Institute. Thank you for welcoming me so very cordially.

As to the typewriter, since the space

is limited, I think the small desk with one pedestal would probably be best. Also the noiseless typewriter does seem to me a very good idea. If two people are working close together it must be a great saving on the nerves.

I had hoped to make a final visit to Princeton, but there was so much to be done in New York the last few days that it was impossible. I have asked Mary Lancaster to give into your keeping for the summer the keys to Dr. Lowe's filing cabinets, since she is a good friend of mine and I knew could be trusted to do it. - My address for the summer, in case you should need it, is the American Express Company, Rue Scribe, Paris. I hope you will have a fine vacation and I look forward to seeing you in the fall.

fall. There is some chance that I may do some work for Dr. Lowe in Europe after the summer courses at Brussels end, in which case I should probably come back with him.

Sincerely yours,

Elizabeth Dow

June 14, 1937

Dear Miss Dow:

I had a letter from Professor Lowe the other day from which I gather that you have accepted the position which he has offered you. I am very glad and welcome you to the Institute secretariate.

As there is a question of space, I am not sure what sized desk to order for you--a small desk with one pedestal, a fifty or a fifty-five inch desk with two pedestals, or a secretarial desk which is much larger? Probably a Remington Noiseless Typewriter would be the best machine for you inasmuch as Professor Lowe will be working while you are using the typewriter. However, if you prefer something else, please let me know.

Thank you so much for introducing to us Miss Marget Cutter who has probably told you that she will be at the Institute next year.

With all good wishes for a happy summer, I am

Miss Elizabeth Dow
246 East 74th Street
New York City
ESB:MBG

Sincerely yours,

ESTHER S. BAILEY

May 11, 1937

My dear Miss Dow:

Thank you for your letter of May 10. I shall be very glad to see you and to meet Miss Cutter on Saturday, May 15, at nine or later in the morning.

Mrs. Porter has already called, and we have authorized her to procure the table of Professor Lowe's choice. She is going to submit samples for rugs and curtains for Professor Lowe's seminar rooms, and I am sure that you will find her very helpful and cooperative.

Sincerely yours,

ESTHER S. BAILEY

ABRAHAM FLEXNER

Miss Elizabeth Dow
246 East 74th Street
New York City

ESB

246 East 74th Street
New York City

May 10, 1937

My dear Mrs. Bailey :

I expect to be in Princeton again the coming
weekend, and wondered if I could bring to
your office, to meet you, a friend of mine
named Margot Cutler. It occurred to me
that she might qualify for the position you
told me about. She is a very good student,
has worked a lot with Rowley in the Oriental
field, and took Heyfeld's course here the first
half year. He has spoken very highly of her. I

think she knows some ancient Greek too.
She understands about the situation and
wouldn't expect anything to come of it neces-
sarily, but is looking for something of the sort,
and since she is to be in Princeton this weekend
too, I thought it would be a good chance
for you to meet. She has a class at 11, I
believe, so perhaps we could come in a
little before 10.

If this is not convenient for you, I'm
sure some other time could be arranged.

I am going to write to Mrs. Porter and
hope we may be able to settle some of the
domestic details!

Very sincerely yours,
Elizabeth Dow

RECEIVED AT

PRINCETON, N.J.
39 PALMER SQUARE, WEST,
TELEPHONES 2275

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NLT	NIGHT CABLE LETTER
	RADIOGRAM

Form
16

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1938 OCT 19 PM 3 48

ABRAHAM FLEXNER=

INSTITUTE OF ADVANCE STUDY PRINCETON NJ=

THANK YOU FOR YOUR WIRE. INTEND TO LEAVE FOR NEWYORK SUNDAY
FOR A WEEK. WOULD BE HAPPY TO COME ON TO PRINCETON TO SEE
YOU. WOULD APPRECIATE YOUR ADVISING ME AT THIS ADDRESS A
CONVENIENT TIME ANY PART OF NEXT WEEK=

EDMUND LAWRENCE DORFMAN.

Telephone Your Telegrams to **Postal Telegraph**

FIRST NATIONAL BANK BLDG.
ONE FEDERAL STREET
BOSTON, MASS.

SUITE 708
LIBERTY 0587

EDMUND LAWRENCE DORFMAN
ATTORNEY AT LAW

October 17, 1938

Abraham Flexner, Director
Institute for Advance Study
Princeton, New Jersey

My dear Mr. Flexner:

At the advice and suggestion of Professor Nathaniel H. Frank of M. I. T., I am writing to you for an appointment at your early convenience. Matters which I discussed with Professor Frank would be of interest to you in your work, we believe.

I intend to leave for New York on Wednesday of this week and if I may have your kind favor in hearing from you before my departure, I could plan to come on to Princeton from New York shortly thereafter.

I would deeply appreciate your wiring me collect whether or not it would be convenient for you to see me about that time.

Very sincerely yours,

Edmund Lawrence Dorfman
Edmund Lawrence Dorfman

ELD:ZF

(COPY)

July 2, 1937

Dr. Israel E. Drabkin
225 West 106th Street
New York City

My dear Dr. Drabkin:

Your letter of June 30 has come while
Dr. Flexner and all the professors in the School
of Humanistic Study are on vacations. I shall en-
deavor to get in touch with some of them, but it
may be that it will not be possible to send you a
reply until September.

Very truly yours,

(Signed) Esther S. Bailey

Secretary

ESB:MBG

*Assured - July 11 - negative, because of lack
of facilities & personnel. A.T.*

The College of the City of New York

THE CITY COLLEGE

THE PREPARATORY HIGH SCHOOL: TOWNSEND HARRIS
LEXINGTON AVENUE AT 23RD STREET

LATIN DEPARTMENT

225 West 106th Street
New York, June 30, 1937.

Dr. Abraham Flexner
Director , The Institute for Advanced Study
Princeton, New Jersey.

My dear Dr. Flexner:

I am considering making application for membership in The Institute for Advanced Study, but before doing so I should like to discuss one or two matters with you.

In the first place, would it be possible for my attendance at the Institute to be limited to the second term of the academic year 1937-8? I am teaching at the Preparatory Division of the College of the City of New York, and can, at this time, apply for leave only for the second half of the year.

I took the degree of Ph.D. in the field of Greek and Latin Literature at Columbia University. My dissertation was on the Copa of the Vergilian Appendix. For the last few years I have been working in the field of Greek and Roman philosophy and science. I am at present engaged in gathering material for a source book in Greek and Roman science, in collaboration with Professor Morris R. Cohen of the College of the City of New York, with whom you undoubtedly are acquainted.

Were I to come to Princeton I should plan to continue my researches in this field. Would there, to your knowledge, be any others, either in the School of Mathematics or in the School of Humanistic Studies, working along these or kindred lines? I should appreciate your letting me know if you have any information about this.

Sincerely yours,

Israel E. Drabkin

P.S. I take the liberty of enclosing a recent paper of mine on Greek science.

CLASSICAL WEEKLY

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NOVEMBER 30, 1936

WHOLE No. 803

AN APPRAISAL OF GREEK SCIENCE

Despite the increased attention that has been given, in comparatively recent years, to the history of science and to the history of Greek science in particular,¹ the opinion is still prevalent in many quarters that the scientific aspect of the Greek genius is only of secondary importance. In the Hellenic period, it is held, patient and detailed observation and explanation of phenomena were neglected for philosophical and metaphysical speculation as to the ultimate constitution of matter and of the universe; while in the Hellenistic and subsequent periods, when more attention was devoted to the special sciences, organized experiment, it is held, was rarely undertaken and, in any case, very little progress was made toward the discovery of those quantitative relations with which modern experimental science so largely concerns itself. There is, of course, an element of truth in these views, and certainly they have not been confined to superficial thinkers. Thus Alfred Whitehead writes (*Science and the Modern World*, 10):

The Greek genius was philosophical, lucid and logical. . . . Their minds were infected with an eager generality. They demanded clear, bold ideas, and strict reasoning from them. All this was excellent; it was genius; it was ideal preparatory work. But it was not science as we understand it. The patience of minute observation was not nearly so prominent. Their genius was not so apt for the state of imaginative muddled suspense which precedes successful inductive generalization.

And George Santayana (*Reason in Science*, 4-5):²

The first period in the life of science <i. e. the Greek period> was brilliant but ineffectual. . . . Men of science were mere philosophers. . . . No

¹ Complete bibliographical material may be found in: George Sarton, *An Introduction to the History of Science*, Volume I (The Carnegie Institution of Washington, 1927), supplemented by the *Critical Bibliographies* regularly appearing in *Isis*; P. Brunet and A. Mieli, *Histoire des Sciences: Antiquité* (Paris, Payot, 1935).

scientific tradition could arise, and no laborious applications could be made to test the value of rival notions. . . . Another circumstance that impeded the growth of science was the forensic and rhetorical turn proper to Greek intelligence. . . . Worse influences in this field could hardly be imagined, since Plato's physics ends in myth and apologue, while Aristotle's ends in nomenclature and teleology.

All that remained of Greek physics, therefore, was the conception of what physics should be—a great achievement due to the earlier thinkers—and certain hints and guesses in that field. . . .

At its second birth <i. e. the Renaissance period> science took a very different form. . . . It was a patient siege laid to the truth which was approached blindly and without a general, as by an army of ants; it was not stormed imaginatively as by the ancient Ionians, who had reached at once the notion of nature's dynamic unity, but had neglected to take possession, in detail, of the intervening tracts, whence resources might be drawn in order to maintain the main position.

The danger in views such as those I have just quoted lies in the emphasis placed upon only one aspect of the scientific activity of the Greeks, i. e. the consideration of those larger questions where science and philosophy merge. I shall try in what follows to show that, although of the greatest importance, this is a very incomplete view of the science of the Greeks and should not be made the sole basis of a comparison between Greek scientific thought, and the scientific thought of subsequent ages. An embracing view of the subject would include the whole development of approximately a thousand years, and would be concerned not only with the working of the mind of the Greek scientist-philosopher grappling with the basic questions of existence and reality, of the infinite and the infinitesimal, of continuity and discontinuity, of determinism and chance, of change and persistence, of space and time, of substance and form, but would consider also the working of the mind of the Greek scientist seeking to find order in the motion of

² See also Henry O. Taylor, *Greek Biology and Medicine*, 42 (Boston, Marshall Jones Company, 1922).

heavenly bodies, or to discover the size and shape of the earth, or the distance of sun, moon, and stars, or to understand the phenomena of lever, pulleys, vibrating strings, floating bodies, falling bodies, projected bodies, reflected and refracted light, rainbows, eclipses, and a thousand others. An embracing analysis would concern itself not only with the work of the Greek physician observing and recording the course of disease, or studying, by dissection, the functions of organs and tissues, or classifying the known species of plant and animal life, or investigating the homology of organs in various species, but also with the working of the mind of the humblest artisan as he faces the problems constantly posed by his craft and from the solution of which the application of the rational method of science may be inferred. In the nature of the case I shall not be concerned so much with a precise cataloguing of substantive achievements as with methods of attacking and answering problems and with the progress of the spirit of rational investigation.

Before we examine the work of the Greeks in the physical and experimental sciences, work which is not, as we have seen, the object of widespread appreciation, let us consider briefly a field in which the greatness of Greece is universally acknowledged, pure mathematics. But precisely in what does the greatness consist? The growth of our knowledge and appreciation of Egyptian and of Babylonian mathematics³ so far from dimming the brilliance of Greek mathematical achievement has given it new luster. In Egypt at least a thousand years before the dawn of Greek mathematics, problems that were by no means confined to the 'practical' were posed and solved, the constancy of the ratio of the circumference to the diameter of the circle was accepted and a remarkably close approximation to its value employed, formulas stating exactly or with close approximation the areas or volumes of various geometrical figures were known; and even before this, among the Babylonians, remarkable skill had been attained in the

solution of arithmetical and geometric problems leading to linear, quadratic, and cubic equations. But, so far as we know, the ideal of the rigorously deductive proof still remains the achievement of Greek mathematics. The Egyptian mathematician checked his work in the sense that he showed the solution fulfilled the terms of the problem; the Greek mathematician has, by the fourth century or earlier, attained complete control over the method of proof by axioms, postulates and a series of theorems. The Egyptian mathematician is adept at certain types of fractions, and, with their help, solves problems in arithmetic and geometric progression; the Greek mathematician goes further and works out a deductive theory of ratio and proportion which by its application to incommensurable quantities serves to clarify the problem of the irrational, and influences all subsequent thought on the subject of mathematical continuity. The Babylonian mathematician achieves brilliant results after what is, presumably, an empirical discovery of correct methods; but the sense of the logically demonstrable character of correct procedure still must be placed to the credit of Greece. Not that the Greeks were unappreciative of the importance of empiricism in the *discovery* of certain types of theorems, as distinguished from their *proof*. Archimedes does not hesitate to apply the principle of the lever to aid the discovery of mathematical relations of areas or volumes, a procedure described in *The Method*. But the complete distinction between this procedure and deductive proof is never forgotten by the Greek mathematician. Though the debt of Greek mathematics to Egypt and the East was great, the advance beyond them was far and decisive.

In passing from pure mathematics to the substantive sciences, let us recall very briefly something of the aims and methods of the various types of science. Science seeks to find elements of order in the phenomena of nature—order in the sense of some invariant relation. This invariant relation may take the form of an invariable association of properties which permits us to recognize and to classify a particular body or a particular animal as this or that substance or as this or that species of animal. Again, an invariant relation may be found to connect two or more processes and to constitute what we generally call the relation of cause and effect, or, apart from temporal sequence, an invariant relation in the form of a mathematical equation may be found to connect, for example, the volume and pressure of gases under given conditions. For instances of all these types of order science constantly searches, but it searches also

³ Despite great advances in our knowledge the sources are still so fragmentary that my remarks here are quite tentative. I may refer to Otto Neugebauer, *Vorgriechische Mathematik* (Leipzig, Springer, 1934), to the publication of the Moscow Papyrus and the mathematical cuneiform tablets in Abteilung A of *Quellen und Studien zur Geschichte der Mathematik*, to the penetrating studies in Abteilung B of that series, to the articles of T. E. Peet in *The Journal of Egyptian Archaeology* (see also the summary of Egyptian mathematics in the Bulletin of the John Rylands Library 15 [1931] 409-441), and to the editions of the Rhind Papyrus by Peet (1923) and by A. B. Chace, H. P. Manning, L. S. Bull, and R. C. Archibald (1927-1929).

for even more comprehensive manifestations of order in nature under which the former might be subsumed, such as a theory of universal gravitation. Science discovers these invariant relations, or laws, from the most restricted to the most comprehensive type, by reasoning about that which is observed in nature. The scientist submits his guesses, hypotheses, if you will, to the test of experiment, and discards, refines, or expands his hypotheses on the basis of his observations, ever trying to see in the particular problem a manifestation of a larger order.⁴ Toward the formulation of hypotheses the scientist is aided by his knowledge of phenomena and by genius. It is this genius that enables him to see an analogy between the phenomena in question and other phenomena that have previously been dealt with successfully, or to abstract from the complexity of phenomena precisely those features which will reveal an underlying order previously not appreciated, and thus, by a change of viewpoint, to open new vistas and possibilities of conquest. Now these very elements of reason and observation, of analogy and abstraction, of hypothesis and experiment played their part in the science of the Greeks as well as they do in modern science, and on a scale by no means as restricted as certain critics of Greek science would have us believe. Finally, in ancient as well as in modern science the goal of a completely rational system embracing all nature, though never realized, is always a challenge and a guiding force.

The mutual interplay of reason and extraordinarily keen observation towards the goal of a completely deductive science based on assumptions suggested by the observations is well exemplified in the development of astronomy among the Greeks from Thales and Pythagoras to Ptolemy.⁵ Not only the discoveries, inferences, and conjectures, of a substantive character, e.g. the sphericity and the size of the earth and of the heavenly bodies, the source of the moon's light, the explanation of eclipses, the obliquity of the ecliptic, and the precession of the equinoxes, but the solutions of the geo-

metric problems involved in reducing to order the motion of the heavenly bodies, whether by systems of concentric spheres or by systems of eccentrics and epicycles, are, and will always remain, classics of scientific thought. In this connection, it should be noted as a special achievement of Greek science that the possibility of more than one choice of coördinates by which to orient the cosmos was appreciated in some quarters and led to the notion of the earth's daily rotation about its axis (Heracleides of Pontus) and of its annual revolution around the sun (Aristarchus of Samos). That certain of the assumptions in Greek astronomical works such as Aristarchus' *On the Sizes and Distances of the Sun and Moon* and Ptolemy's *Almagest* are now, as a result of superior measuring instruments, known to be erroneous, should not at all detract from the authors' achievement from the point of view of method.

Other fields which lent themselves to organization in a deductive mathematical system based on postulates suggested by experience, and in which the Greeks seem to have laid firm foundations were optics, hydrostatics, acoustics, and certain branches of mechanics. For example, Euclid and Hero⁶, basing their analysis on the equality of the angles of incidence and reflection, an equality which experience indicates, deduce propositions with respect to images in mirrors of various shapes and combinations. Ptolemy studies refraction experimentally and finds that his measurements need only small correction to make them accord with his hypothesis as to the precise mathematical relation connecting the angles of incidence and refraction. In this search for a mathematical relation connecting two variables (angle of incidence and angle of refraction), even though the particular relation adopted is not the true one,⁷ it is to be noted that Ptolemy is using methods which have been so widely applied since Galileo's time that many have failed to note that they were also applied long before. From postulates on the nature of fluids, again suggested by phenomena, Archimedes deduces fundamental propositions in hydrostatics, e.g. that a body immersed in a fluid loses a weight equal to that of the fluid displaced (*On Floating Bodies*, I. Prop. 7). That the

⁴ The progressive generalization of viewpoint in science is well exemplified by the development, beginning with Greek notions, on a limited scale, of the relativity of motion and rest, toward the notion of generalized coördinates in modern physics. See S. Hessen, *Die Entwicklung der Physik Galileis und ihr Verhältnis zum physikalischen System von Aristoteles*, Logos 18 (1929) 339-361.

⁵ See the summary of Greek astronomy to Aristarchus in Part I of T. L. Heath, *Aristarchus of Samos* (Oxford, 1913), and the more complete account in the first two volumes of P. Duhem, *Le Système du Monde* (Paris, Hermann, 1913-1914).

⁶ Euclid, *Catoptrics*, Proposition 1; Hero, *Catoptrics* 4 (the treatise, formerly ascribed to Ptolemy, is cited from the Latin translation which is alone extant: see Hero Alexandrinus, *Opera* 2.324 [Leipzig, Teubner, 1900]).

⁷ See the edition by G. Govi of Eugenio's (twelfth century) Latin translation of an Arabic version of Ptolemy's *Optics*, Introduction XXIV-XXVIII, 144.19 to end of 150 (Turin, 1885).

results in such treatises are put in deductive form should not obscure the fact that the *discovery* of the propositions may have been quite empirical, and that in any case the adequacy of the assumptions and of the development must constantly have been tested experimentally. In much the same way the quantitative relation, discovered, it seems, by the Pythagoreans, between the pitch of a vibrating string and its length, a relation which is at the foundation of Greek musical theory, must have been, together with its consequences, the subject of experimental investigation. Again, in theoretical mechanics, the substantial progress in statics that we find e.g. in the *Mechanica* attributed to Aristotle, and in the works of Archimedes, Philo of Byzantium, and Hero of Alexandria⁸ presupposes wide experimental activity. Such experimental activity may have suggested and must have tested the principle of the lever and of the other machines based on that principle, and may well have suggested and tested propositions regarding centers of gravity or the composition of velocities.

I have selected these illustrations of the quantitative approach in Greek science to show the inadequacy of the view that would distinguish the Greek scientist from the modern scientist on the supposed ground that the former studied nature in its qualitative manifestations while the latter seeks to discover quantitative relationships connecting phenomena. As a matter of fact, however, what is manifested in phenomena are complexes of qualities, and science progresses when it is able to abstract from such complexes one quality for special consideration, and is able then to find some means of transforming the consideration of the quality in question (which may be, in itself, non-additive) to a metric basis. All science involves abstraction and there is ample evidence, in all periods of Greek science, of the type of abstraction to which I refer. Often, as in the case of dynamical theory, the deficiency or sterility of the Greek development was due to the failure of abstraction to go far enough. It was abstraction in the highest degree and a looking beyond the actual phenomena that led, in the seventeenth century, to the formulation of the principle of inertia upon which could be based a fruitful dynamical theory and, as a special case thereof, a sound development in statics.

The advance of modern science has been marked by the discovery of means, of the sort

⁸ E.g. Archimedes, *On Plane Equilibriums*; Hero of Alexandria, *Mechanica*; Philo of Byzantium, *Mechanica* 4 (= *Belopoiika*). 20-21 (where reference is made to a treatment of the theory of the lever in a no longer extant portion of the work).

I have just now indicated, which permit of the measurement of variations in qualities under investigation, devices like the thermometer, or the spectroscope, etc. The experimental use of such instruments has, in turn, made further advance in theoretic science possible. Limited though the Greeks were in the means at their disposal for various types of scientific investigation, the striving of their best representatives was basically toward the same goal as that toward which modern science strives, and was prosecuted in the same spirit and with the same basic methodology.⁹ Yet in considering the contribution of the Greeks it is better to fix attention on *their* advance over their predecessors than on *our* advance over the Greeks. At all events one should be very critical of the type of general statement frequently made to the effect that the shortcomings of Greek science were due to an aptitude for the deductive as opposed to the inductive, or the static and the geometric as opposed to the dynamic and the kinetic,¹⁰ or the qualitative as opposed to the quantitative, or the theoretic as opposed to the practical.

I should like now briefly to indicate some examples of observation, analogy, classification, and experiment in fields other than those to which allusion has already been made. The remarkably clear clinical descriptions of the course of various diseases in the Hippocratic Corpus (*Epidemiae* 1 and 3), the descriptions of the structure, physiology, generative processes, embryological development, and habits of hundreds of species in Aristotle's zoological works,¹¹ the minute descriptions of organs and tissues and their functions by Galen¹² on the basis of careful dissection,

⁹ Of the numerous passages setting forth, in the abstract, the aims, ideals, and methods of science, good examples are to be found in W. A. Heidel, *The Heroic Age of Science, passim* (The Carnegie Institution of Washington, 1933). The detractors of Greek science have held that in practice the Greeks did not live up to these ideals.

¹⁰ For such a view see F. M. Cornford, *The Laws of Motion in Ancient Thought*, 20-28 (Cambridge, 1931), and H. Dingler, *Das Experiment*, 210-252 (Munich, Reinhardt, 1928). The evidence, I believe, shows the view to be entirely too broad.

¹¹ Charles Singer in his essay, *Greek Biology and its Relation to the Rise of Modern Biology*, in *Studies in the History and Method of Science* 2.1-100 (Oxford, 1921) takes up some of Aristotle's most penetrating biological descriptions and shows how certain facts pointed out by Aristotle have waited until comparatively modern times for rediscovery.

¹² Particularly in his *De Anatomicis Administrationibus* and *De Usu Partium*. The important anatomical work of Erasistratus and Herophilus in the third century B.C. is often referred to in Galen. On the question of the extent of dissection and vivisection among the Greeks see L. Edelstein, *Die Geschichte der Sektion in der Antike, Quellen und*

and Theophrastus' description of types of seed germination (*Historia Plantarum* 8.2) constitute some of the most important material, from the point of view both of substance and method, which Greek science has left us.

Of analogical reasoning on the basis of similarities e.g. between lower and higher animals, between plants and animals, between the organic and the inorganic, many examples might be cited, particularly from certain treatises of the Hippocratic Corpus.¹³ I may also refer to the famous fragment of Empedocles (in Aristotle, *De Respiratione* 13) in which the poet seeks to explain respiration on the basis of the action of the clepsydra.

As an outstanding example of classification I may cite the classification which is implicit in Aristotle's zoological works.¹⁴ It is a great achievement of trained observation that on the basis of the recording of something more than five hundred species—a half million species of insects, alone, are said to be known today—Aristotle was able to classify the animal kingdom along lines which in many respects are still regarded as valid.

I have in what preceded referred at many points to experiments and the experimental method. I should like to refer to a few additional examples. The phenomena of suction were studied at a very early date in connection with the question as to the corporeality of air and the existence of a void. From elementary experiments with siphon and clepsydra began the development which culminates in the ingenious experiments and devices described by Philo of Byzantium and Hero of Alexandria.¹⁵ The experiments described in the Hippocratic Corpus,¹⁶

Studien zur Geschichte der Naturwissenschaften und der Medizin 3 (1932) 100-156, as well as the pertinent material in the works cited in note 1, above.

¹³ E.g. in *De Semine*, *De Natura Pueri*, *De Morbis* 4. On analogy, particularly in the Hippocratic Corpus, see O. Regenbogen, *Eine Forschungsmethode antiker Naturwissenschaft, Quellen und Studien zur Geschichte der Mathematik, Abteilung B*, 1 (1931) 131-182.

¹⁴ See pages 15-20 of the paper cited in note 11, above. Note, in particular, the inclusion of Cetacea among the viviparous species (*Historia Animalium* 6.12).

¹⁵ Hero of Alexandria, *Pneumatica*; Philo of Byzantium, *Pneumatica* (an Arabic version of the lost Greek text and, for certain parts, a medieval Latin version of an Arabic version are available). The atomistic approach of these authors and of various medical writers suggests the influence of Straton of Lampsacus, who combined certain features of atomism with Peripateticism.

¹⁶ On experiment in the Hippocratic Corpus see T. Beck, *Das wissenschaftliche Experiment in der Hippokratischen Büchersammlung, Verhandlung der*

the interesting quantitative experiment of Erasistratus in which the loss of weight suffered through perspiration and respiration is measured,¹⁷ Galen's physiological experiments to determine e.g. the mechanism of respiration and pulsation, the functioning of the kidneys, the connections and mechanism of brain and nervous system,¹⁸ are some of the many that come to mind in this connection.

Now it is quite true that, in proportion to the whole of Greek scientific literature, the part devoted to the actual description of method, observations, and conclusions in organized experimental work is small. But it is to be remembered that the publication of the results of experimental research as such, which is so important a factor in scientific progress today and which bulks large in current scientific literature, was much more restricted in antiquity. Furthermore, ancient sources generally inform us of results rather than of experimental technique and procedure.¹⁹ That is one reason why the literary record of the experimental activity of the past is no safe guide to the actual extent of that activity. Again, technological advances bespeak a constant activity in experimentation, an activity which for various reasons did not find its way into the literary record. In this we may see a difference between the modes of disseminating scientific information in ancient and in modern times, but not a generic difference between ancient and modern science, as such.

49 *Versammlung Deutschen Philologen und Schulmänner*, 197-201 (Leipzig, Teubner, 1908); A. Bier, *Hippokratische Studien, Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin* 3 (1932), 51-78, and the articles of G. Senn there (71, note 5) cited. Bier erroneously holds (73) that the Corpus is entirely philosophical rather than scientific, disregarding its diverse composition which exhibits many different degrees of empiricism.

¹⁷ A bird is kept without food; the difference between the original weight of the bird and its weight at a subsequent time together with that of all visible excreted matter will measure the loss through other channels (*Anonymus Londinensis* 33.45-51 [Diels]). Despite its crudeness, there is implicit in this experiment a notion of conservation of mass. At the beginning of the seventeenth century Sanctortius performs similar experiments on human beings and initiates the modern study of metabolism.

¹⁸ For examples of experiment in Galen see pages 884-886 of the work of Brunet and Mieli cited in note 1, above. Of particular interest are experiments involving the vivisection of animals, e.g. those experiments in which the spinal cord is cut into at various levels, and the particular type of paralysis resulting from severance at a particular level is noted.

¹⁹ See Charles Singer, *Greek Science and Modern Science—A Comparison and a Contrast*, 16-20 (London, University of London Press, 1920).

The fact that those Greek scientists of the early period of whom literary records are preserved were also philosophers and the fact that over a long period of time the most influential figure in Greek science was Aristotle²⁰ have combined at times to give the impression that Greek science was philosophical rather than scientific. That one and the same person may have devoted thought to both scientific and philosophic questions should not, however, prevent us from appraising his contribution in each field, any more than the presence of superstitious elements in an ancient scientist should be permitted to obscure his really scientific work. Lynn Thorndike in the first volume of his well-known work, *A History of Magic and Experimental Science*, emphasizes magical and mystical features in certain Greek and Roman scientists to the neglect of the scientific element in their work. But the distinction in aim and spirit between magic and science cannot be too strongly emphasized. It should be remembered, furthermore, that science in its quest for more and more comprehensive viewpoints, a quest to which I have made reference, often finds itself at the borders of philosophy. And the borders are ill-defined precisely because it cannot always be foretold what will prove capable of verification or falsification and what will not. In any case science can never be completely divorced from philosophy whether the latter serves merely to interpret the propositions of science or to criticize its reasoning and abstractions, or to formulate theories of knowledge and reality upon which a system of science must be based.

Indeed, great as is the achievement of Greek science in its second great period, the Hellenistic, with its specialists in mathematics, physics, astronomy, medicine, biology, and geodesy, it may reasonably be held that it was precisely in the union of science and philosophy in the earlier period that Greece made a more significant contribution to the future. It is from this period that we have our first record of sustained and penetrating thought on questions that in one

²⁰ The great importance of Aristotle should not be permitted to obscure contrary currents such as the development of atomistic viewpoints in mechanics and medicine (see note 15, above) and criticism of Aristotelian dynamical theory, e.g. in the school represented in later times by Philoponus. This is, of course, apart from a general tendency toward empiricism and scepticism, a tendency which was manifested in greater or lesser degree in various periods of Greek science and philosophy as it has been in modern times. Such tendencies are usually corrective reactions against an excessive tendency in the other direction. In fact Aristotle himself represents, in a sense, a reaction toward empiricism from the tendencies of Platonic science.

form or another have continued to engage men's minds. I have already referred to some of these basic questions. It is of particular interest to consider this matter at present when the relation between science and philosophy is more intimate than it has been for a long period, a rapprochement necessitated by the fundamental questions raised in connection with relativity theory, new viewpoints in atomic physics, and the basic principles of biological science.

I need but mention at this time, in connection with Greek scientific achievement, the notion of the basic unity of nature, the idea of element in the theory of matter, the elaboration of the atomic hypothesis, the penetrating attempts to understand the nature of chemical change, the abstraction of the notion of force, the steps toward principles of conservation and least action, the concept of organism in biology, the beginnings of a theory of evolution.²¹ Thought on basic scientific questions such as these leads naturally to thought on more general philosophic questions culminating in the problems of universals, of causality, of God.

The achievement, then, of the Greek mind at the various levels of scientific activity is a rich achievement both in substance, and in what is even more important in the history of civilization, in spirit and method. It is unnecessary to enter into the question as to whether the achieve-

²¹ With respect to all these items source material abounds. I have also found the works of Émile Meyerson, especially his *Identité et Réalité*, very valuable in tracing the development of scientific ideas like atomism, inertia, conservation of matter, etc., from ancient to modern times.

In connection with the theory of chemical change the development of two schools, that which goes back to Aristotle's *De Generatione et Corruptione* and that which goes back to the ancient atomists is traced by P. Duhem, *Le Mixte et la Combinaison Chimique* (Paris, Naud, 1902). Note also the literature referred to in Chapter 7 of the work of Brunet and Mieli cited in note 1, above.

With respect to the principle of conservation of weight see note 17, above, and compare Lucian, *Demonax* 39. In connection with the conservation of effort and the principle of least action see 156.6 of the work cited in note 7, above.

Very instructive are analogies between ancient and modern theories of elements, e.g. in the matter of differentiation by shape (compare ancient atomic theories as well as the rôle played in antiquity by the five regular polyhedra with modern atomic models) and of transmutation (compare ancient theories with modern results in connection with radioactivity and the bombardment of atomic nuclei).

The modern controversy as to determinism and indeterminism in physics (a controversy now raised in connection with quantum theory) may be compared to a similar controversy in ancient atomism (note the function of the Epicurean *clinamen*).

ment of the Greeks in non-scientific activities, in art and literature, is more significant. It will suffice here to point out that certain qualities of the Greek mind, its innate curiosity, its aesthetic bent, love of order, rationalism, and so forth, reveal themselves in both spheres of activity. But since it is the scientific achievement of the Greeks that has been more often forgotten, it is well to call special attention to it now. Classical students have in the past been criticized for not paying sufficient attention to this achievement. But scientists were at least equally to blame because for so long they taught science as if it began in the sixteenth century or even in the nineteenth century. In recent years, however, both among classicists and among scientists there has been not only a somewhat more sympathetic appreciation of Greek science but a growing feeling that the scientific spirit is in no sense opposed to the classical spirit, and in no sense opposed to the truly humanistic spirit. Be that as it may, the classicist ought to be able, it seems to me, to appreciate Greek science without losing any of his love for Greek art and literature, and the scientist ought to be able to do the same without losing any of his profound admiration for the modern kingdom of science.

ISRAEL E. DRABKIN

Townsend Harris High School
The College of the City of New York

REVIEWS

The Transition from the Ancient to the Medieval World. By R. F. Arragon; pp. vi, 134. New York: Holt, 1936. (Berkshire Studies in European History.) \$1.00

This comprehensive and well-written survey (designed as a week's collateral reading) will prove useful to two classes of reader: the undergraduate student will come from it with a clear idea of the main lines of political, economic, and cultural development during the late Empire, and those who are engaged in teaching general courses in Roman or Medieval History will gain here a bird's eye view of the period and will particularly welcome the critical summary of the special theories which have been put forward to account for the Decline and Fall. The title of the book is significant of the author's intention to regard the centuries falling between the Antonines and Theodoric not primarily as a decline from the standards of civilization set by the preceding two and a half centuries, but as an organic historical process having its own significance by virtue of its continuity with earlier and later processes; and it may be said at once that Professor Arragon has in the main performed his

difficult task of condensation and appraisal successfully.

Constitutional and political changes are treated with economy of statement and good judgment. The sections on government intervention and eventual decentralization, occupational and financial obligations to the State, and the implications of universal citizenship and a universally operative legal code may be singled out for their effectiveness. Considerations of space apparently prevented the inclusion of a section or two on the qualities of Byzantine culture and its connections with the Persian and Islamic cultures; a few pages added at this point would have rounded out the account and served to correct the widespread notion that Byzantine history is simply the tail end of Roman decadence.¹

In the second chapter, which outlines economic and social change, the present survey renders its greatest service. Here a variety of controversial issues and matters of basic importance are ably condensed and handled with critical tact. Professor Arragon convincingly shows how bureaucratic policy injured commerce and agriculture by draining off 'the wealth of the productive classes at the same time that it strangled their economic activity' (43); how a policy of peace, manumission, and a low servile birth-rate reduced greatly the supply of skilled slave labor before the third century and undermined the prosperity of agriculture and capitalistic manufacturing; why international trade declined and how localization of industry, commerce, and agriculture paralleled decentralization of government; how the villa system and the ascendancy of agriculture over industry and commerce spelled the ruin of classical urban civilization and foreshadowed the later social conditions of feudalism and serfdom.

The collapse of ancient society has seemed to the modern world so complete that scholars have gone behind economic and sociological causes and have proposed various climatic and biological theories to account for its all-inclusiveness: soil exhaustion, extended periods of drought or cumulative diminution of rainfall, racial degeneration, a falling birth-rate especially among the upper classes, an exhaustion of society analogous to the aging of an organism.² These proposals,

¹ The proper distribution of emphasis between West and East, which is an exacting task for any historian of this period, is finely preserved in the excellent volume of H. St. L. B. Moss, *The Birth of the Middle Ages* (Oxford: Clarendon Press, 1935) 395-814.

² Arragon does not reckon with the bubonic plagues, which, frightful though they were, are given undue emphasis by Hans Zinsser in *Rats, Lice and History*.

which at best must remain partial explanations and at their worst are unscientific, are competently examined by Professor Arragon and every fair-minded reader with no specialist's ax to grind will be grateful for his brilliant presentation of the intricate problems involved and will feel inclined to rely upon the impartiality of his judgment. Two general objections, he finds, may be urged against the non-sociological theories: first, every theory of this class is either scientifically provable but remains as yet unproved because of deductive reasoning or the inconclusiveness of the data, or it is unscientific and rests on prejudice or analogy (such as the theory of degeneracy through racial intermixture and the life-cycle theory); and secondly, all theories of this kind tend to exonerate man at the expense of nature. Production declined because, 'so far as we certainly know, the control and use of natural resources changed rather than the resources themselves, the organization of society rather than the physical environment' (71). Miscegenation did not weaken racial stock; it did weaken the ligaments of society by diluting cultural traditions. The all-inclusive formula of the birth, maturity, and decline of civilizations, which has been revived of late by the romantic pessimist Oswald Spengler, is of all naturalistic theories the least susceptible of scientific proof. If we may figuratively speak of loss of vitality on the part of the Roman world, we must remember that we are not stating a biological fact but describing a sociological process, 'a weakening of the distinctive social ties of antiquity and of the incentives, aspirations and ideals of classical civilization' (81).

The concluding sections of the book deal topically with the cultural residua of the Empire. Younger students are sure to find much illumination in the sections on the Use of Allegory, The Failure of Classical Ethics, and the Rise of Faith. An account of the Christian view of life ends the survey, and the story of the interaction of Church and pagan society is properly reserved for a companion volume of *The Berkshire Studies*.³

GEORGE K. STRODACH

Lafayette College

Daughters of Atreus. By Robert Turney; pp. 127. New York: Knopf, 1936. \$2.00

This reworking of the familiar Agamemnon-Choephoroe tale is a first play whose author seems likewise to be conversant with the remainder of Greek tragedy and with Homer. By

³E. R. Goodenough, *The Church in the Roman Empire*. New York: Holt, 1931.

reworking I do not mean such perfumed efforts as those of Spitteler to naturalize Greek myth in a modern fairyland of poetry and philosophy, nor again the psychoanalytic and febrile adaptations of von Hofmannsthal. Mr. Turney makes with the resources of modern dramatic art an honest, often a fortunate attempt to lure onto our stage the spirit of the Mycenaean era.

True, in the working out of extraneous characters like Fria, Vortigern, Cheops, and Aesculapios (sic), he often gives information astoundingly new to a scholar. Occasionally also there pervades his scene a rationalizing temper more fitting the fifth than the twelfth century B.C., a totally modern conception too of Greek restraint, moderation, and what not that jars. This last offends one almost as much as the Greek-life-was-one-long-revel tune of neo-pagans. In America it is of course only the Puritan inheritance that descends through our theological approach to the Classics, plus the playing field of Eton and Rugby-cum-Renaissance reverence. I don't think the Mycenaeans were so civilized as Homer, let alone Mr. Turney, makes them, certainly not so restrained as a professor of Greek lecturing on Sophocles to a ladies' seminary.

The play, though, embodies again and again the very spirit of pure poetry. It is well-written, too well in fact. From the closet its long speeches soar. On the stage, during a brief life (October 14-24) recently in New York, it limped even in the expert hands of Eleonora Mendelssohn (Reinhardt's leading lady), Maria Ouspenskaya (veteran of the Moscow Art Theatre), and others, when they carried it through after a magnificent first act which included the slaughter of Iphigenia. The stage-director evidently thought Mr. Turney was better than Shakespeare, who regularly in wise hands gets at least a little dose of condenser and play-doctor. Mr. Turney is good, but not so good as all that.

F. A. SPENCER

New York University

Roman Gaul: The Objects of Trade. By Louis C. West; pp. xi, 191. Oxford: Basil Blackwell, 1935. 7s 6d

West continues his series on the objects of trade in the Roman provinces under the Empire with a third book, devoted to Gaul. One chapter is allotted to each group of commodities and to certain miscellaneous items such as waterways and foreigners. Each chapter ends with a table listing the individual objects, their place of origin and place where found. What little value the book possesses lies in these tables, for the brief commentaries consist of a series of chatty remarks showing no historical insight, antiquar-

*The case in which a uniform motive force constantly attends the object moved is not under discussion here.

missiles as covered by the cases of natural and unnatural motion. For an object—I shall confine myself in what follows to the case of what Aristotle would call a 'heavy' body, whose natural motion is downward—hurled either directly upward or even obliquely upward would have its maximum speed at the beginning of its motion, whereas one hurled directly downward or obliquely downward would have its maximum speed at the end of its motion. This would leave the reference to missiles unexplained.

The solution would seem to lie in our considering τὰ ῥιπτούμενα as bodies set in motion *in the true horizontal direction*, i. e. neither upward (directly or obliquely) nor downward (directly or obliquely), and in our considering ἀνὰ μέσον as the midpoint of the trajectory in this horizontal direction. The inclusion of the case of true horizontal motion completes the series of possible rectilinear motions³. The assigning of the midpoint as the place (or the time) of the maximum speed of these missiles seems, furthermore, to be an a priori assumption of Aristotle. The horizontal plane marks the boundary between the motions which are κατὰ φύσιν (in the absolute sense, or in the sense that, if the motion be oblique, the vertical component is downward) and those that are παρὰ φύσιν (in the absolute sense, or in the sense that, if the motion be oblique, the vertical component is upward). It seems, then, that Aristotle, or whoever invented the doctrine, put the ἀκμή of motion in this intermediate, limiting plane midway between the ἀκμαί in the other two cases from aesthetic motives, to secure symmetry and a type of continuity (imperfect though it is) throughout the whole realm of rectilinear motion. For this reason I should interpret ἀνὰ μέσον strictly as the midpoint rather than as any point between the beginning of the motion of the missile and the point where the motion ceases to be truly horizontal.

The most serious difficulty with this view, as I have stated it, is that the ancient commentators, whose sources, generally speaking, reach back to times very close to those of Aristotle himself, do not seem to put it forth in any detail and are obviously not satisfied with it. Thus Simplicius (In Aristotelis De Caelo Commentaria 423.8–36 [edition of J. L. Heiberg, Berlin, Reimer, 1894]) considers that inanimate objects, whether elements or compounds, when they are hurled, move with motion παρὰ φύσιν⁴ until the effect of the original force is lost, and that thereafter the motion is κατὰ φύσιν⁵ (in the case of a compound the φύσις of the prevailing element therein governs, as usual). He would seem to include, then under motion παρὰ φύσιν (and therefore with the ἀκμή at the beginning) a motion im-

parted to such a body in the true horizontal direction. He adopts, therefore, as an explanation of the passage under discussion, a suggestion referred to, though not, apparently, approved, by Alexander of Aphrodisias, to the effect that the only ῥιπτούμενα which, sent out horizontally, attain their ἀκμή in the middle of the motion are those controlled by a ψυχή, e. g. the limbs of animate beings. It is perfectly true that such motion commences and ceases gradually, as Simplicius indicates. Yet, as an explanation of Aristotle's language, in which there is no inkling at all of any discussion of animate beings, the idea is so far-fetched that it must be dismissed.

Alexander suggested (423.37–424.16) that more probably ἀνὰ μέσον referred to the circumstance that missiles, since they move neither downward nor upward, but ἐπὶ τὸ μέσον (424.12: this obviously refers to the horizontal plane), have their maximum speed in the horizontal plane. Alexander interprets the passage, then, as meaning that, since the motion is entirely accomplished in the horizontal plane, the maximum speed is attained there. In this he is followed by Mr. J. L. Stocks⁶, translator of the De Caelo.

This seems to me a needless restriction of Aristotle's meaning and a reduction of the idea to an insignificant truism. Aristotle has just told us (288a 21) *at what point* in the path of a body moving naturally, and *at what point* in the path of a body moving unnaturally the maximum speed is reached, namely at the goal and at the start, respectively. We expect him to tell us *at what point* in the path of a missile the maximum speed is reached. According to the view of Alexander, however, Aristotle does not give us this information.

Again, Alexander (424.4–6), followed by Mr. Stocks, would interpret οὐ and ὅθεν (288a 20–21) as the natural place of the body in question, and would restrict, needlessly, in my opinion, the idea of motion κατὰ φύσιν and motion παρὰ φύσιν to cases where the body reaches its natural place and starts from its natural place, respectively. Why should the typical cases of motion, as we experience it, be excluded? The accelerated fall of a heavy body from a height so that its maximum speed is attained at the moment when the body encounters an obstacle which halts it is a clear case of motion κατὰ φύσιν and the obstacle may be considered the end (οὐ) of the motion. Similarly, the upward projection of the heavy body from a point, say, on the surface of the earth is certainly a case of motion παρὰ φύσιν, and the point from which the body is projected may be considered the terminus a quo (ὅθεν). So far from considering (with Mr. Stocks) these cases as excluded from Aristotle's discussion in 288a 21, I should consider them as precisely those which he had in mind. I should also consider as in a certain sense subsumed under motion κατὰ φύσιν and motion παρὰ φύσιν, respectively, the cases of obliquely downward and obliquely upward motion (for heavy bodies), respectively, as explained above⁷.

³In the passage under discussion, horizontal motion is rectilinear, just as is motion directly toward or directly away from the center of the universe. Aristotle seems not to have considered the horizontal path in the sense of the circular path all points of which are equally distant from the center of the universe.

⁴Simplicius should, I think, be understood as referring here to cases in which there is no downward component in the original projection.

⁵That the trajectory of a projectile is a parabola was not demonstrated until Galileo's time. Before that, the first part and the last part of the trajectory were generally considered rectilinear, and it was held that a curve bridged these two rectilinear parts. The curve was considered the resultant of the constantly diminishing tendency in the original direction and the natural tendency downward.

⁶Aristotle, De Caelo, Translated by J. L. Stocks (Oxford: At The Clarendon Press, 1922).

⁷It is possible, but not necessary, to consider horizontal motion as a mixture of motion κατὰ φύσιν and motion παρὰ φύσιν (see Mr. Stocks's note on the passage in question). This does not, however, in itself give a complete explanation of ἀνὰ μέσον.

With respect to my chief contention, that Aristotle in this passage asserts that in the case of the horizontal motion of missiles the maximum speed is attained midway between the point at which the motion commences and the point at which the motion ceases to be truly horizontal and becomes natural downward motion (or a combination of both), there are indications that the passage was so interpreted by some in antiquity. That the passage was so interpreted in the medieval and subsequent periods is certainly true.

Themistius, writing in the fourth century, gives the interpretation which I have just indicated, and refers also to the view that it is the motion of animate beings that Aristotle had in mind, a view which, as we have seen, is at least as old as Alexander. Themistius writes: 'Those bodies which move horizontally, as arrows which are shot, have their maximum speed in the middle of their motion. Now this is easily observed and obvious in the case of animals....'

Simplicius, in the sixth century, after setting forth the view which, as we have seen, Alexander held to be the more probable, goes on to say (424.17-18) that perhaps Aristotle uses the terms 'beginning', 'middle', and 'end' not merely *τοπικῶς*, but *χρονικῶς*, and with respect to the trajectory (*κατὰ τὴν κίνησιν*), that is, to the view that *ἀνὰ μέσον* refers to motion in the horizontal plane is added the notion of the maximum speed of projectiles at the midpoint of the time (or the space, or both, since they will, presumably, coincide) of the horizontal motion. But Simplicius gives us only the barest hint of this, and passes on to another discussion.

It is not until we come to St. Thomas that we find any attempt to set forth a reason for the strange doctrine which holds that the speed of missiles projected horizontally increases after the projection and until the midpoint of the course is reached. It is instructive to examine St. Thomas's note on the passage because this note contains material important in connection with the great scientific debate of the later medieval period and of the Renaissance. This debate, to which I shall refer below, involved this very doctrine of the acceleration of projectiles, a doctrine which had to be completely refuted before the principle of inertia, as we have it in the Galileo-Newtonian system, could be accepted.

St. Thomas, after setting forth the various interpretations of the passage we are discussing, and after indicating the plausibility of interpreting *ἀνὰ μέσον* not merely of the horizontal plane, but of the midpoint, in time, of the motion, goes on to give the reason for the acceleration of projectiles moving horizontally. He writes⁹:

'For the motion of such projectiles is caused by the impulse of the carrying medium which more easily receives the impulse of the mover than does the heavy body itself which is being hurled (as is clear from Physics 8), and for that reason the motion of projection is swifter in the middle, when a great quantity of air has been set in motion, than at the start, when only a small

quantity of air has as yet been moved, and swifter, also, than at the end, when the force impressed by the projector is already beginning to be weakened. An indication of the truth of this is that missiles of this sort do not make as great an impression on a target which is very near or on one that is very far as on one that is moderately distant'.

The reference is to the well-known Aristotelian theory that projectiles depend for the continuance of their motion, after they have broken contact with the original projector, on the motion of the medium. It is to be noted, however, that nowhere, so far as I know, does Aristotle, in explaining the effect of the medium on the motion of projectiles, make reference to the type of accelerated motion of projectiles which we are discussing.

Whatever doubts the early commentators may have had, and whatever doubts we may have as to precisely what Aristotle meant in the passage under discussion, it was generally taken for granted in later medieval times and in the Renaissance that Aristotle believed that the speed of missiles increased after contact with the original projector was lost¹⁰. The view that projectiles attain their maximum speed in the middle of their trajectory seems, furthermore, to have been imputed, at times, to Aristotle even for the case of missiles not projected along the true horizontal¹¹. For this last view the passage we are discussing furnishes no support, and surely no other passage does.

The history, subsequent to St. Thomas, of the erroneous doctrine that the speed of missiles increases after the original projection (I do not, of course, when I say 'erroneous', refer to downward projection, direct or oblique), is told, in detail, by Pierre Duhem in the course of his *Études sur Léonard de Vinci* (Paris, Hermann, 1906-1913. Three Volumes)¹². What enables a missile to move after the original projector loses contact with it? Is it the motion of the air, or is it some force impressed on the missile by the projector? This question, debated in antiquity, is discussed again with great vigor in the later medieval period and in the Renaissance. The doctrine of *vis impressa*, so ably set forth in the sixth century by Philoponus (though, in all probability, it was not original with him), is taken up by scientists in the fourteenth, fifteenth, and sixteenth centuries, and, despite strong opposition, mainly from the Averroists, achieves its successful culmination with Galileo.

Yet even among those who contributed in one way or another to the laying of the foundations of modern dynamics, we note that the idea that the speed of projectiles increases after the projection is long maintained. Among the many sharing this view we find Nicolas Oresme, Marsilius of Inghen, Leonardo da

¹⁰Though modern students of Aristotle have, at times, also adopted this interpretation, there is not the unanimity that characterized the opinion of this earlier period.

¹¹See e. g. Galileo in his early work, *De Motu* (Le Opere di Galileo Galilei 1.308.20 [Florence, Barbera, 1890]). Even so careful a student of Aristotle as Pierre Duhem seems to extend the proposition of Aristotle to all projectile motion (see his *Études sur Léonard de Vinci* 1.128). This, I am convinced, is an erroneous interpretation, for it would lead to the proposition that a missile hurled straight upward receives an initial acceleration after the projection, a contradiction of *τοῖς δὲ παρὰ φύσιν ὄντι*, 288a 21.

¹²See also Duhem's paper, *De L'Accélération Produite par une Force Constante*, *Congrès International de Philosophie* 2 (1904), 859-914.

⁹It is very doubtful whether the late translations of Themistius's commentary (no longer extant) fairly represent his view. I cite Themistii In Libros Aristotelis De Caelo Paraphrasis Latine, 105.9-12 (edited by S. Landauer [Berlin, Reimer, 1902]). This is a Latin translation of the Hebrew paraphrase of Themistius's commentary. ¹⁰Sancti Thomae Aquinatis Opera Omnia 2.150b (Rome, 1884).

Vinci¹⁵, Bernardino Baldi, Dominic Soto, and Jerome Cardan. The combined influence of Aristotle, whether he was correctly or incorrectly interpreted, and of St. Thomas was probably the most important factor in attracting support to the doctrine.

The view that the air is a factor resisting motion rather than an indispensable concomitant of motion attained general acceptance only after a long struggle. Duhem shows, in this connection, the importance of the work done in the fourteenth century at the University of Paris, in particular by Jean Buridan and Albert of Saxony, and traces the influence of these men on the subsequent founding of a fruitful science of dynamics. In this whole movement, which led to the

¹⁵We may note, in particular, Leonardo's elaboration of St. Thomas's discussion of the effect of the medium in producing the initial acceleration, and also the reference to the experiment with the target. See P. Duhem, *Études sur Léonard de Vinci* 1.333, 2.213 (or pages 869 and 873 of the article cited in note 12, above).

development of the principle of inertia in the Galileo-Newtonian system, the question of the motion of projectiles was necessarily involved. In fact, the further examination of this question and of related questions ultimately led—and still leads—to the basic questions of the void, of action at a distance, and of the foundations of physical theory.

It is interesting to note, though it should in no way affect our interpretation of the passage under discussion, that, throughout the long debate to which I have referred, the view that Aristotle taught the doctrine of the initial acceleration of projectiles seems to have gone unquestioned. Our own interpretation, however, of Aristotle's meaning should be based, in my opinion, on the considerations set forth at the beginning of this paper.

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ISRAEL E. DRABKIN

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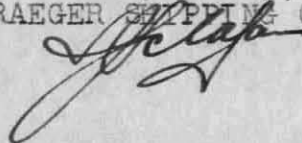
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Institute of Advanced Study
69 Alexander Street
Princeton, N.J.

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[Signature]

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- ☐ Consular Invoice.
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SS:mr

A. Dresden

January 28, 1936.

Dear Professor Dresden:

Thank you very much for your kind note
of the 27th, which I found on returning to
Princeton today.

I am extremely sorry that I missed
seeing you before you left. It has been a great
pleasure to have you among us, and I hope that
there may be every possible opportunity for keeping
the wires open between Princeton and Swarthmore.

With all good wishes,

Ever sincerely,

ABRAHAM FLEXNER

Professor Arnold Dresden
Swarthmore College
Swarthmore, Pennsylvania

AF/MCE

Monday morning
Jan 27, 1936

Dear Dr Flexner,

I came in to say goodbye, up Waverly
and to shake your hand. These months have gone
past too rapidly. - Some time I hope to have
a chance for a talk with you about what a very
good time it has been for me. Just now I feel
very grateful to the I. P. A. S. to have made them
a possibility for me. - Mrs Drennon and I want
to send our warm greetings and best wishes
to Mrs Flexner and to you. Glück auf's

Amos Drennon

A. Dresden

SWARTHMORE COLLEGE
SWARTHMORE, PENNSYLVANIA
MATHEMATICS AND ASTRONOMY

December 11, 1934.

Dr. Abraham Flexner
Institute for Advanced Study
Princeton, N.J.

Dear Dr. Flexner:

Many thanks for your letter of November 30. I accept with enthusiasm the grant-in-aid which the Institute has made for 1935-36. I am sorry this acknowledgment has been delayed for so many days.

Sincerely yours,

Amos Dresden

AD:edil

November 30, 1934

Professor Arnold Dresden
Swarthmore College
Swarthmore, Pennsylvania

My dear Professor Dresden:

On the recommendation of the professors
of the School of Mathematics I take pleasure in inform-
ing you that a grant-in-aid of \$1,500 will be made to
you that you may be associated with the School of Mathe-
matics of the Institute for Advanced Study during the
academic year, 1935-1936.

Looking forward with great pleasure to
the association with you, I am

Very sincerely yours,

ABRAHAM FLEXNER

AF:ESB

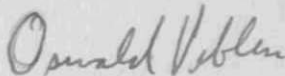
THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

Fine Hall, November 27, 1934

Dear Doctor Flexner:

At the meeting of the professors last week it was voted to recommend a grant-in-aid for Professor Arnold Dresden of Swarthmore, in the amount of \$1500 for the academic year 1935-6. I have a letter from Dresden saying that he will be glad to accept this, and I therefore suggest that you send him the official notification.

Yours sincerely,



Oswald Veblen

Dr. Abraham Flexner
20 Nassau Street
Princeton, N.J.
OV:GB

F.W. Dry

February 27, 1933

Dear Dr. Dry:

I beg you to accept my very warm thanks for your favor of January 22 and for the publications which accompanied it. I regret to say that, as you will see from the bulletins being sent to you, the Institute for Advanced Study will begin simply with a school of mathematics, and we shall not expand until general financial and social conditions in this country are very greatly improved.

With all good wishes, I am

Very sincerely yours,

ABRAHAM FLEXNER

Dr. F. W. Dry
Massey Agricultural College
Palmerston North -
New Zealand

AF:ESB

F.W.Dry

Massey Agricultural College,
Palmerston North,
New Zealand.

22nd January, 1933.

Dr. Abraham Flexner,
61 Broadway,
New York City, N.Y., U.S.A.

Dear Sir,

After reading about your Institute for Advanced Studies in the English journal, "The New Statesman and Nation," I have decided to ask if there is a possibility of my obtaining a post there for work in Animal Genetics. Copies of most of my publications are enclosed.

I finished my University course in 1914, at Leeds in Yorkshire, my native county. My early research was in Entomology. For part of 1915 I was attached to the United States Bureau of Entomology as a Carnegie Travelling Scholar. In 1917 I was transferred from the Friends' Ambulance Unit to become Assistant Entomologist in the Department of Agriculture in British East Africa, now Kenya Colony. After four years in Africa I went to the University of Illinois in 1921, where a fellowship was awarded to me, with the intention of studying Animal Ecology as a basis for work on African disease-carrying insects, but family matters called me back to England.

This return to England led me into a different branch of zoology. I was elected to an endowed fellowship in the Department of Textile Industries at Leeds, being anxious to obtain the degree of Doctor of Science, which was awarded to me in 1925. My field of study, suggested by Professor Walter Garstang, was "The comparative anatomy, histology, and pigmentation of mammalian hair as a basis for breeding and other experiments." Professor Garstang is a morphologist and he pointed to the need in genetical work for detailed studies of characterisation and development. He thought that such work would make, for example, some contribution to our knowledge of the nature of inherited factors and the way their effects are produced.

In 1928 I came to New Zealand as head of the Department of Zoology in the new Massey Agricultural College. My own lectures are confined to Genetics and Wool Zoology, and most of my time is given to wool research. My results have not yet been published at all fully, but the enclosures will indicate the ideas that have emerged.

My research work has always had rather direct bearing on Agriculture, but I have done fundamental work at the same time. In my essay in the Quarterly Bulletin of the Imperial Bureau of Animal Genetics I show the kind of problem it is my determination to tackle even if my association with Animal Husbandry continues. I should much prefer, however, to study these fundamental matters in a part in pure Genetics, turning naturally

for material to the coats of rodents and sheep.

In addition to the problems mentioned in my essay there is one that specially fascinates me. This is the question, as Babcock and Clausen express it, whether or not a developmental variation may become a germinal variation. For such a research the coats of small rodents seem favourable material. This, like the other fundamental problems, calls for a very long programme, and I am young enough, being forty-one, for it to be reasonable to devote myself to enterprises of this kind.

Yours very truly,
J. W. Day

September 20, 1938

Dear Professor Duell:

I have just returned from my summer vacation and find on my desk your very kind letter of September 3, with my secretary's answer thereto, and this morning I am quite overwhelmed by the receipt, with your compliments, of the superb two volumes of The Mastaba of Mereruka. The bookplate of the Institute will be affixed to these glorious volumes immediately.

I do not know how I can sufficiently thank you for your generosity and kindness. Perhaps the best I can do is to say that before long I hope we shall be able to reciprocate by sending you Professor Meritt's volume on the Athenian Tribute Lists, which is now passing through the press. My appreciation of your kindness goes far beyond these words, for I have the feeling that in these dark times everything that promotes the solidarity of scholars is an illustration of what perhaps may ultimately come to prevail in other human relations.

Meritt and Herzfeld will be here shortly and will, of course, as my secretary wrote you, see your volumes immediately. Miss Goldman plans to remain in Tarsus until the end of November, but I shall bring the volumes to her attention as soon as she returns.

With all good wishes and very deep appreciation,

Sincerely yours, ABRAHAM FLEXNER

September 12, 1938

Professor Prentice Duell
The Oriental Institute
1155 East 58th Street
Chicago, Illinois

My dear Professor Duell:

In Dr. Flexner's absence I acknowledge receipt of your letter of September 3, in which you say that you are sending an author's complimentary copy of "The Mastaba of Mereruka" for the library of the Institute for Advanced Study.

When the publication comes I shall be happy to bring it to the attention of Professor Meritt, Miss Goldman, and Professor Herzfeld, as you request, and I am sure that they, as well as Dr. Flexner, will appreciate this contribution to our library.

Very truly yours,

MARIE C. EICHELSEER

THE ORIENTAL INSTITUTE

THE UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS, U.S.A

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1155 EAST FIFTY-EIGHTH STREET

September 3, 1938

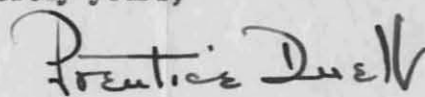
Dr. Abraham Flexner
Institute for Advanced Study
Princeton, New Jersey

Dear Doctor Flexner:

I am sending you an author's complimentary copy of "The Mastaba of Mereruka" for the library of the Institute for Advanced Study. As you will note, the plates depict one of the earliest comprehensive records of human activity and illustrate the technique of the artist of the Pyramid Age.

I should like Ben Meritt and Miss Hetty Goldman, friends of mine from the School at Athens, to see the volumes; also Doctor Ernst Herzfeld, whom I knew in Persia.

Sincerely yours,


Prentice Duell

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THOMAS J. DUFFIELD
REGISTRAR OF RECORDS

April 15, 1939.

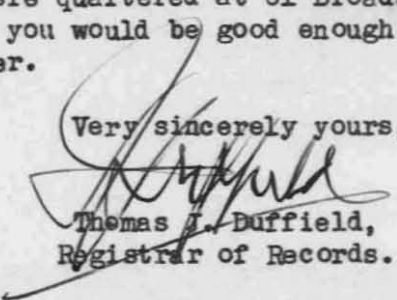
Dr. Abraham Flexner
Director, Institute for Advanced Study
Princeton, N.J.

Dear Dr. Flexner:

Thank you very much for your letter regarding Mr. Howson. I now understand fully your position which was, of course, unknown to me before. If the situation were otherwise, I am sure you would be glad to call Mr. Howson's qualifications to the attention of the authorities at the University.

I notice that Mrs. Bailey is the Secretary of your organization. If she is the same Mrs. Bailey I knew when you were quartered at 61 Broadway, I would appreciate it if you would be good enough to extend my greetings to her.

Very sincerely yours,


Thomas J. Duffield,
Registrar of Records.

TJD:MRL

April 10, 1939

Dear Mr. Duffield:

I have your kind letter of April 6 with reference to Mr. Howson. I do not believe there is anything I can do at Princeton that would be of any service to him. The Institute for Advanced Study has no general library and, though the University has not made a permanent appointment of a Librarian, I am afraid I cannot see my way clear to opening the matter with any of those in authority, for I have made it a strict rule not to interfere in University matters.

Sincerely yours,

ABRAHAM FLEXNER

Mr. Thomas J. Duffield
Registrar of Records
Department of Health
125 Worth Street
New York City

AF/MCE

CITY OF NEW YORK
DEPARTMENT OF HEALTH
BUREAU OF RECORDS

125 WORTH STREET, NEW YORK, N. Y.

THOMAS J. DUFFIELD
REGISTRAR OF RECORDS

April 6, 1939

Dr. Abraham Flexner, Director
Institute for Advanced Study
Princeton, N.J.

Dear Dr. Flexner:-

It is many years since I have had the pleasure of seeing or addressing you. My present purpose is to call to your attention the fact that Mr. Roger Howson who, for twenty-nine years served at Columbia University, ultimately as Librarian, has recently been retired from that position, apparently because of fundamental differences of opinion regarding the purpose of a University Library and the manner in which it should be used, with Dr. Clarence C. Williamson, who became Director of Library Service at Columbia only a few years ago.

I do not pretend to know anything of the underlying merits of the two points of view, but I do know that Mr. Howson is a gentleman, and among his friends and acquaintances he is considered a scholar. He is a graduate of Cambridge University in England, where he majored in the Classics. It is my understanding that he believes that a library should be used for the extension of knowledge and for general cultural purposes rather than to create impressive statistics of visits to the Library, books taken out, etc..

Because I have heard that there is an opening at Princeton where Mr. Howson's qualifications could be effectively utilized, and because of the fact that Mr. Howson is still a relatively young man, and still has, I believe, a capacity for extremely useful service, I am taking the liberty of calling these facts to your attention in the hope that if this is a matter in which you have any part, Mr. Howson be given consideration for this position. If, on the other hand, this is a matter in which you are not directly concerned, I would greatly appreciate it if you would be good enough to pass this word along to such persons as may have this subject in hand.

Mr. Howson's friends -- among them many of the members of the various Faculties at Columbia University -- feel that he has been outrageously treated. Many of your acquaintances on the Faculty would, I am sure, tell you in glowing terms of Mr. Howson's scholarship and his ability.

The sincere belief that Mr. Howson has much to contribute in his special field has encouraged me to write you about him in this way. Any action you might take to further his interests would be tremendously

Dr. Abraham Flexner, Director

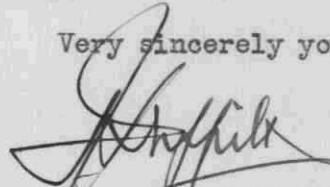
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April 6, 1939

appreciated by me and many other friends here in New York City. He may be reached either at his New York address, 327 East 50th Street, or at his summer place at Newtown, Connecticut.

With kindest personal regards and the hope that I may have the pleasure of seeing you again in the near future, I am

Very sincerely yours,



Thomas J. Duffield
Registrar of Records

TJD:JE

Duke U. Press

January 8, 1934

Duke University Press

Durham, North Carolina

Dear Sirs:

Will you kindly send one copy of
Charles A. Ellwood's Methods in Sociology to

Professor David Mitrany
The Lower Farm
Kingston Blount
Oxford, England

and forward the bill for the same to me?

Very truly yours,

ESTHER S. BAILEY

Assistant Secretary

October 3, 1938

Dear Mr. Dunham:

I have your interesting and moving letter of September 30, with its enclosures. I am sorry to say that the Institute has absolutely no facilities in the field of Egyptology, and I do not believe that it is practicable to make a start with a man who has reached his 77th year. A university like Chicago, with its Oriental Institute, could, I should suppose, provide him with a stipend and take advantage of his rich and mellow scholarship; and the same must be true of other institutions like the Metropolitan Museum in New York or the Boston Museum of Fine Arts.

My heart is wrung by letters of this kind which I receive daily, but in all too many cases I am helpless.

With all good wishes,

Sincerely yours,

ABRAHAM FLEXNER

Mr. Dows Dunham
Department of Egyptian Art
Museum of Fine Arts
Boston, Massachusetts

AF/MCE

MUSEUM OF FINE ARTS
BOSTON, MASSACHUSETTS
Department of Egyptian Art

September 30th 1938

Dr. Abraham Flexner
Institute for Advanced Study
Princeton University
Princeton, New Jersey.

Dear Dr. Flexner:-

I am writing at the suggestion of Francis Taylor, Director of the Worcester Art Museum. I may add, by way of introduction, that I am a son of the late Dr. Carroll Dunham and a nephew of Dr. Edward K. Dunham of New York, both of whom were well known to Dr. Simon Flexner, and I believe to yourself.

A few days ago I had a talk with Mr. Taylor concerning Professor Georg Steindorff of the University of Leipzig, whom I regard as the most eminent of surviving German Egyptologists. Mr. Taylor advised me to communicate with you, saying that he believed there was no Egyptologist at the Institute for Advanced Study. I am venturing, therefore, to tell you what I can of Professor Steindorff.

I have known him throughout my professional career, and of late intimately. When I saw him last month in England he told me that the situation had become impossible for him in Germany (he is non-Aryan), and although he faced virtual penury and loss of occupation, he was determined to come to America. He had reason to believe that he could do this by making the necessary financial sacrifices, and assured me also that he expected to be able to bring with him his large and important professional library. He asked me to see if it would be possible to find

-2-


suitable occupation for him, not only because of his need for financial assistance, but because he desires to have the opportunity of continuing work in his profession.

The name of Georg Steindorff is a household word in Egyptology; his scholarship and authority are unquestioned. Despite his 77 years his intellectual capacity and activity are unimpaired. Of his personality I cannot speak too highly - he is universally beloved for his charm, kindness, and humor. The fact that he has been able to survive so long despite his racial "impurity", is due largely to the fact that he has so many friends among his former students and colleagues.

Professor George A. Reisner of Harvard, the dean of American excavators in Egypt, when he heard of Steindorff's difficulties, wrote me a letter to be used as a testimonial, a copy of which I enclose. I feel sure that Herbert Winlock, Director of the Metropolitan Museum in New York, himself a distinguished Egyptologist, would give an equally high estimate of him.

I enclose a brief summary of Professor Steindorff's professional history, a list of his principal writings, and a copy of his last letter to me. Should you desire any further information which I can supply, I am entirely at your service.

Sincerely yours,


Dows Dunham
Associate Curator.

Three enclosures.