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Introduction

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# ALBERT EINSTEIN

A Picture of His Life  
and His Conception of The World

by  
DAVID REICHINSTEIN

**Popular — Understandable**

EDWARD GOLDSTON LTD.  
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*To the memory of the Martyr of  
Science, Theodor Lessing, forgotten  
by his friends and foully murdered by  
his enemies this book is reverently  
dedicated by the author.*

*David Reichinstein.*

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## Preface to the Present English Edition.

Since the publication of the first German edition of this book, about two years have elapsed.

During these two years, the economic crisis has grown more acute, the struggle for existence of the individual and of the state grows more and more difficult, and at the same time the European Fascism in Germany assumes downright barbaric forms. The world is going to pieces.

Accordingly, humanity loses much of its joy in life, and the conception of the world held by the cultured loses more and more of its romance, grows more prosaic all the time.

Einstein still adheres to pacifism in principle, as before, but he grows more decided with respect to actual politics and advises the Belgians to arm themselves for the protection of their culture and their nation. With a growing keenness he realizes the imminent danger.

The democratic politician designates this change in the conception of the world as a decision which is indispensable for the protection of the democratic principles; the former Social Democrat on the other hand, often tends to Communism.

The world conception of the politician is becoming more concrete.

But also the philosopher draws further and further away from the abstract. As time goes on, he gradually abandons the quasi aprioristic, established ethical principles.

It is interesting that in his question to Sigmund Freud, "Is there a possibility of directing the psychic development of humanity into channels which will make them more resistant to the psychosis of hatred and destruction?"

Einstein has not only the uneducated in mind. It is rather the so-called "Intelligentia" — writes Einstein — which most easily succumbs to the fateful mass-suggestion, because it arrives at its conceptions not directly from experience, but from a perusal of printed matter.

It is the same consideration which caused the post-war Bolshevist laborer to mistrust the educated socialist; "he took his conceptions not from life, but from books."

In this sense the present edition underwent a supplementation by the insertion of the chapter "The Year 1933", and at the same time a change from the edition of the year 1932.

As to the position which Einstein takes up regarding the publication of this book, I had many talks and much correspondence with him on this subject in the year 1923. At that time he was still in Germany and he expressed doubts about circulating the book there in view of the growing enmity towards him. From his letter of Febr. 5. 1932, which is reproduced photostatically below, I quote the following passage: "I have also forbidden the publication of the Reiser book in the German language, and on the other hand have given you permission to publish your book in foreign languages." I complied with the dissatisfaction which he expressed later about certain passages in the MS., by omission and alteration of the offending passages, after consulting a person intimately connected with Einstein.

Finally, I do not want to neglect expressing my heartfelt gratitude to certain people and institutions who have helped me with biographical and with literary material; in the first place I am thinking here of the International Institute of Intellectual Co-Operation in Paris, Professor E. Starkenstein, Prague, Editor-in-Chief Dr. Sigmund Blau, Prague, and Editor-in-Chief Dr. A. B. Rev, Prague.

David Reichstein  
Prague, 1934.

## Preface to the German Edition of the Year 1932.

When I had before me the task of presenting a picture of Einstein's life it was apparent to me at once that this would not be a book for which I could ask Einstein *to* write the introduction; in other words, I had from the first to be satisfied with the fact that Einstein would disagree with many of my statements about his person.

And this for two reasons. First, the difficulty of self-recognition would stand in the way here.

Why—asks Schopenhauer—do we really not know what we look like in spite of all mirrors, and cannot imagine ourselves as we can imagine any person of our acquaintance? This is a difficulty which blocks the way of "knowing ourselves" already at the first step.

The individual *sees* himself in the mirror looking fixedly straight ahead, whereby the significant play of his eyes is lost to him.

Besides this, however, Schopenhauer points out a much more important circumstance: "We are not able to look at our picture in the mirror with that glance of alienation which is the condition of the objectivity of its comprehension; because in fact, this glance is finally based on moral egoism with its deeply felt Not-I." This glance of alienation is necessary, according to Schopenhauer, in order to perceive all short-comings in a purely objective manner and without subtraction. Instead, this very egoism, on catching sight of our own self in the mirror, whispers: "This is no Not-I, but I " ; these words, according to Schopenhauer, act like a "noli me tangere" and prevent the purely objective interpretation.

The second reason for the biographer not being in agreement with the consciousness of his object lies in the following facts:

Every biographer must clearly understand that he paints his own subjective picture of the soul of the personality in question. The biographer must not deceive himself and the reader: it is only a subjective picture which he is able to paint. The painters and sculptors are much more straightforward than the writers in this respect; with the former, the subjectiveness of the representation finds its expression in a much more pregnant and unveiled manner.

Fifty painters reproduced the head of the Paris actress, Maria Lani, in order to study the essence of femininity and every painter saw the same face in a different manner, which fact gave Lothar Brieger the opportunity of quoting the words of the poet: "She resembles the spirit which comprehends her—not herself."

Up to now, three Einstein biographies and countless newspaper articles about Einstein have appeared. Probably there will be more as time goes on, many more.

I now confess: I paint Einstein's picture as I see it with my subjective eyes, refracted by the prism of what I possess by right of up-bringing and education, as well as by the prism of the temporally changing events.

I try to check the subjectivity of the representation by attaching great importance to the description of Einstein's conception of the world; in fact I describe this conception of the world in his own words as far as possible. Where it is in any way possible and permissible, I try to quote instead of using my own words. Einstein said to me incidentally, that often his thoughts are not reproduced exactly. By quotations I attempt to give an exact reproduction of his conception of the world.

The reader will recognize besides, that in the part Entitled "Einstein's Police Registration Form" for instance,

it has been possible by comparative quotations to fix **two** stages of development in Einstein's conception of the world between which lies an interval of eleven years; the reader will notice hereby, how close Einstein comes to Goethe and Simmel in the question of "religious need".

I remain faithful to this method of quoting also in cases where I mention the opinion of other authors. Often I quote the opinions of various authors side by side, without reference to the connection between them. Here I make an appeal to the cooperation of the reader. It is left to the reader for instance, to determine whether Einstein's religious state of feeling is identical with Freud's conception of religious feeling, which Freud sets up, only to deny, a short time afterwards.

I here follow the method of Impressionism in painting. The classical painter drew harmonious lines which constantly flow into one another. The impressionist realized that it is not necessary to draw the harmony, the constancy of line; it must originate in the spectator however in a manner all the more pregnant, and the painter throws his colors on to the canvas in blotches sometimes without paying any attention to their continuous blending.

It will often appear to the reader at first sight, that I bring up too much material which does not pertain to the subject, especially in "Einstein and Nationalism". Here I had a difficult task before me; for I had to prove that although Einstein's nationalism has been awakened by events of the day, it nevertheless has its origin entirely in his religious feeling and at the same time is supposed to replace religion for the masses. From this standpoint Einstein's nationalism recalls the revolutionary activity of the great Russian idealists of former times, for instance Prince Kropotkin, who renounced his high social position, honors, and wealth, and tried to merge into the mass of the people.

Here, for instance, I am in need of Simmel's philosophy of religion. How should one otherwise, for example, parry the opinion of Pastoi H. Francke, that Einstein's nationalism is no true nationalism? (See "Einstein in der Politischen Arena", 'Einstein in the Political Arena', Welt am Montag, Berlin, October 19th 1931.)

I do not take into account the fact that Pastor Francke has not understood Einstein's nationalism, which preaches encouragement and self-confidence, dignity and spiritual resurrection of the masses.

I do not take into account the fact that the venerable ecclesiastic was not able to follow the explanations of Einstein, in which, like a Socrates (see Einstein's letter), he explains to the national German Jews the true motives of their thoughts and actions.

I am interested purely and simply in the fact that according to Pastor Francke, Einstein's nationalism "is no true nationalism at all". Did Pastor Francke expect from Einstein, the intellectual and moral genius, an aggressive nationalism in the sense of the conception of the world held by a non-commissioned officer?

With all my respect for the Pastor, it is my duty here, to elucidate the genesis of Einstein's nationalism.

Finally I must justify myself before that reader who will reproach me with having given too much space to questions of religion in this biography, with having returned to Buddhism again and again, and with having recourse to the philosophy of religion.

I ask this reader to take the following facts into account. After Einstein had denied the Jewish faith, he was frequently attacked and even accused of being a renegade. (Chapter IV.)

Should I enter into a long discussion with Einstein's attacker? That would not be the correct way, the pedagogic way. Instead, I try to prepare the reader for problems of

religious philosophy. And now I let the reader speak for me to Einstein's opponent. The reader will now be able to reply to him: "You are an educated man and you will not dare to discuss electro-technical questions for instance, before having made a closer acquaintance with this technical and scientific field. How is it then, that you feel sufficiently confident to pronounce an opinion of your own in the field of religion and even to utter reproaches, before you have studied this difficult field from every point of view?"

It is a great wrong that humans who have a claim to culture adhere to the Jewish or to the Christian religion, only because they happen to descend from Jewish or from Christian parents. If a Jew (or a Christian respectively) only adheres to the Jewish (resp. the Christian) religion, because his parents had the same religion, then his religion is questionable.

If the Jew and the Christian become absorbed in the study of Buddhist philosophy and in the religious philosophy of the European philosophers, do you think, dear reader, that the Jew will then return to the Jewish and the Christian to the Christian religion? I do not think so.

Of course the experimental objects chosen by us must be human specimens valuable from the intellectual standpoint.

I retain the same method of representation in the description of the theory of relativity. First, I initiate the reader into the theory by paths which are as generally intelligible as possible. Here I follow the manner of representation used in Thirring's book mentioned frequently by me. I strive to be pedagogical. In order, however, to reply to the opponents of Einstein here, I introduce the reader, although very briefly, into the empirical philosophy of the modern times.

Finally, I will not omit mentioning that the method

chosen by me of frequently quoting various **authors** if especially effective also In that case where one tries to render a description as objective as possible.

David Reichlnstein.

Berlin, December 1931.

NOTE DURING THE PRINTING OF **THE** GERMAN  
EDITION.

The book reached the publisher with a delay of ten months. During this time no supplementation was carried out, with the exception of the dedication which was written during the printing. Only some objectionable passages were omitted or changed respectively, after a consultation with a person closely connected with Einstein. I wish to express my most cordial thanks to this person here.

David Reichinstein.

October 1932.

## CHAPTER I.

# Who is Einstein? His Youth.

If we follow the course of Einstein's life, we will be most surprised to see with what different problems and different spheres of life this gentle, unworldly, often (especially in early life), almost childlike, deeply spiritual physicist is connected.

Once you may hear his name with reference to the League of Nations, then again a newspaper may publish his photograph together with that of MacDonal at a political reception, now you may see him in the chair at a meeting of the League for the Rights of Humanity, then you may hear his broadcasted lecture at the opening of the World Power Conference, now he is brought into connection with national problems, and finally his Russian friends try to win him over to Bolshevism etc.

He is interested not only in physics and mathematics, but also in astronomy, chemistry, medicine, and philosophy and at the same time in psychology, political economy, and problems of religious philosophy. He is interested in art, especially music, and plays the violin.

He evades even the slightest air of pathos, his flesh begins to creep (his own words) when he hears bombastic phrases; his voice is soft as if all the while he were listening to a small inner voice, as if his words were the echo of his own deep soul. He takes no interest (as he mentions in a letter) in what newspapers write about him. He is superior to the frequently occurring mis-statements in the newspapers about his person.

Spinoza's problem about the "divitiae, honores et Hbidines" (riches, honors and pleasures) so anxiously coveted by most humans does not exist for him, not on account of any self-imposed asceticism, but for the simple reason that spiritual problems, problems of science and pioblems of humanity completely absorb his attention.

He gives the impression of an ascetic without being one and Spinoza's "non ridere, non lugere, neque detestari, sed intelligent' (not to laugh, not to weep, not to scold, but only to think) fits him least of all, for he does not only occupy himself with thinking but he laughs, he groans, and he scolds.

His "amor erga rem aeternam" (love for an immortal subject) does not contain anything outwardly assumed or artificially self-imposed but simply arises from a desire of his whole being; and, regarded from this point of view, he is a superior being. He is modest and sincere. He is musical and plays the violin; but when some one in America wanted to give him a Stradivanus violin, he xeplyed "I am not great enough a musician to be worthy of such a violin." His soul is not to be bribed. He is the tangible impersonation of that truth which is said to have two sides: truth which is knowledge and truth which is justice.

And it is not to be wondered at that people not only want to learn science from him, but that they also try to win him over to the most varied aspects of life so as to be able to say: "Einstein agrees with us." He is the conscience of our age, which is so unsettled that we are afraid of losing our footing, and are constantly seeking some one on whom we can depend.

Let us now follow out the life of this rare man to whom we owe the re-shaping of the world's interpretation, on whom have been lavished, still in his lifetime and in relatively early years, the greatest honors which can be given, and on whom further distinctions are constantly showered

by universities or academies of science, who want to honor themselves through him.

Albert Einstein was born in the provincial town of Ulm on March 14th, 1879. While he was still very young, his parents moved to Munich. Here, in a house standing in a small street away from the noisy center of the town, Albert passed his youth. His father was a non-sectarian, happy-natured merchant, not lacking a certain interest in technical questions; he possessed an electro-technical business. In complete contrast to his father, however, the child showed an early development of mystically religious interests. Was it the influence of the religious instruction he received in school, or was it the expression of his own quiet nature, which caused Albert to find more joy in solitude, where his imagination was fired by all the impressions of nature he received, than in the noisy merry games with children of his own age?

Probably the religious instruction had fallen on fertile ground and a child begins very early to feel the manifestation of some higher power in the phenomena of nature. Here we must look for the beginning of his so highly developed sense of reality.

As we remarked before, Albert found no pleasure in boisterous games with children of his own age. Einstein related afterwards (about 1910) that as a child he used to play with the chickens in the court-yard.

It is an interesting fact that the child learned to talk very late, so that there was even fear of an abnormality. Indeed, slowness of development was characteristic of this child as well as his shyness which made him appear morbid.

He was sent to primary school up to his tenth year; of this school Einstein has no pleasant recollections. The superficial character of the instruction, the purely formal

severity of his teachers, made him, later on, compare these teachers to non-commissioned officers.

With this school the child connected his first impressions of social injustice, of "rich" and "poor". There also his sensitive nature first experienced the stigma of anti-Semitism.

After primary school Albert went to the Luitpold Gymnasium in Munich. Here a warmer feeling for some of the teachers was already awakened in the boy.

If Einstein did not afterwards regard the humanistic ideal of culture in all its phases as suitable for modern education, the boy of fourteen nevertheless showed a taste for the beauty of classical antiquity.

The fervor with which the college boy devoted himself to the study of mathematics, is of great interest. The Pythagorean theorem, which later played such an important part in his theory of relativity, was imparted to him by his uncle without explanation of the proof. Albert brooded over the theorem until he found the proof himself.

In 1894 his parents moved from Munich to Milan. The compulsion of school was lifted for a period of six months. Liberty, the "dolce far niente", excursions into the mountains gave young Albert the chance to draw a full breath of air. Travelling alone on foot from Pavia to Genoa he learns, on the way, to see people as they are and to appreciate them.

This happy time passes very quickly. Einstein's ambition was to study physics and mathematics at the Zurich Polytechnic. He made the move to Switzerland, but, in order to be admitted to the Polytechnic, he had to complete his knowledge at the Cantonal School at Aarau.

He passed his matriculation examination there and could now be admitted to the Zurich Polytechnic. At that time he did not set any great goal for himself. He felt that he was not equal to the struggle of life. He even mistrusted

his own abilities then, and at the time the best thing he desired was to become a teacher; hereby he chose a profession where he would least come into contact with the coarser side of life.

His studies lasted from his 17th to his 21st year.

From that time on he had to depend on himself. He could not expect any help from his parents, whose pecuniary circumstances had been much reduced as time went on.

His own first-hand experiences of life could not cure him of his mistrust of it or of his personal feeling of insecurity.

His hopes of a position as assistant to a physics professor were not realized. Nor did his hope for the post of a teacher in the secondary school come to anything. In the end he landed in Schaffhausen to lead the poverty-stricken life of a private tutor. He earned too little to live and too much to die.

His *five* year's residence in Switzerland made it possible for him to obtain Swiss citizenship in 1901 and this in turn enabled him to obtain the post of a technical expert at the Swiss Patent Office in Bern. The necessary recommendation to Haller, who was then chief of the Patent Office, was furnished by his friend from the university, Marcel Grossmann.

Einstein's fortunes had now taken a turn for the better. He retained this position from the year 1902 to 1909.

In 1903 Einstein married his former fellow, student a South-Slav (Jugoslav) with whom he had studied physics during his college years. This wife brought two sons into the world for Einstein.

This union however was not of long duration. The marriage was dissolved later on during Einstein's professorship at Zurich.

In the seven years during which Einstein was employed

as a preliminary examiner for patent applications, his power of thought expanded to its full magnitude.

Were they the thoughts lying dormant in him from earlier days? Or did the thoughts spring into existence while he was continually forced to gather new learning for the carrying on of his work at the Patent Office? Probably both together.

From Einstein's later conversations in Zurich within the circle of his friends I was able to conclude that the board of directors in the Patent Office was very proud of Einstein's objectively scientific treatment of the patents; it can easily be imagined how the prestige of the Swiss Patent Office rose all over the world with the reception of the replies to and the comments on the various applications for patents; for at that time the world knew nothing as yet of Einstein and the "nervus rerum" behind the statements of the Patent Office could not be suspected.

From other following conversations of Einstein, I found out that while he was sitting alone and undisturbed in his office, he was working and brooding over his theory of relativity.

We must not believe that his particular theory of relativity achieved a lightning birth as a sudden genial flash of thought. When he began working at it he got no results, and after trying in vain for some time, he put the work aside. After a longer interval he came back to the same subject.

And now he experienced the full tragedy of the research worker. He did not succeed in his work but he could not leave it alone and could not stop himself from agonizing over it. He was afraid for his health. Only with the greatest exertion of will-power did he succeed in dismissing his thoughts, in forcing himself not to think of it. But when after his recovery and after a considerable interval he took up his work again, he succeeded.

It is strange how productive a certain short span of Ein-

stein's life was. Not only his particular theory of relativity, but also a great number of other fundamental publications bear the date 1905. His works: "On the Electro-Dynamics of Bodies in Motion", "The Inertia of Energy", "The Law of the Brownian Movement", "On a Heuristic Evaluation of the Production and Conversion of Light", his dissertation, "A New Method for the Determination of Molecular Dimensions"—all these works appeared in 1905.

He was to become unsalaried lecturer at the University of Bern, but soon afterwards, in 1909, he was appointed assistant professor of theoretical physics at the University of Zurich.

Here begins Einstein's really productive work—as a university teacher, as the scientific educator not only of young students, but also of independent research workers, of university lecturers, and of professors of quite varied ages. Here I came to know him and shortly after making his acquaintance I endeavoured always to be within the vicinity of my master and friend.

In 1911 he was appointed full professor at the University of Prague, which brought about an improvement of his economic circumstances. As early as the autumn of 1912, however, he returned to the Technical University of Zurich in the capacity of full Professor, leaving as his successor in Prague, the professor Philipp Frank of whom we shall speak in the last chapter.

In 1914 Einstein was called to the Prussian Academy of Sciences in Berlin. But he returned to Zurich for a short time now and then, so that I had the opportunity at intervals during my Zurich years, of obtaining his advice on my own work.

## CHAPTER II

# Memories of the Years 1910—1917.

In 1910 a friend took me along to the physics discussion (Colloquium) which Einstein was conducting, and introduced me to him. His low calm voice, his deep thoughtful eyes, which did not seem at all teacherish, and his cordiality surprised me. At these meetings for which an evening per week was set aside, new papers were read aloud, this being followed by a discussion. After the colloquium, Einstein went to a café together with those with whom he was most intimate.

Here the discussion was continued and the conversation became more informal.

Soon I was paying Einstein frequent visits at his lodgings. Either I arrived with notes on my current work already prepared, or, as was more often the case, directly with a book or periodical borrowed from the library, and referred him either to a difficulty I had found or to a contradiction in the respective treatise. Imperceptibly Einstein became my teacher in the direct sense of the word. This was all the more important for me as I had studied for a degree in physical chemistry, but the problems I was working on touched difficult questions of physics. Fate really could not have led me to a better teacher.

Later on when I became unsalaried professor at the Zurich University, and supervised the dissertations of my students I took Einstein into my laboratory now and then, and showed him the experiment in question.

In this, Einstein took less interest. First, it was necessary

for this purpose to introduce him to the subject of electro-chemistry then still strange to him, besides which, during the first years at least, I always had the feeling that he found that my practical experience had not been gained under sufficient control, and that my conclusions were not sufficiently accurate.

Second, if Einstein was not immediately able to fit the experiment into his own practical philosophy (*Weltanschauung*) regarding this topic, he questioned the accuracy of the experiment even when I was quite convinced of its accuracy. I therefore emphasize the fact that during the first two years of my acquaintance with him I could not succeed in interesting him in my problems, while on the other hand discussions in fields related to my work developed all the more.

I just want to add that, in general, theoretical physicists only display a strong interest in an experiment when this experiment offers an incontestable contradiction to their own practical philosophy, that is to say, if it contains something essentially new. A discovery, however, which does not threaten this practical philosophy is simply registered and forgotten, be it ever so important.

I remember that I once wanted to demonstrate the polarization effect of light-sensitive selenium cells to Professor Abraham, the late eminent theorist in the laboratory; it was a wonderful discovery, then quite new. Abraham however coolly asked to be excused with the words: "Well I can imagine the effect."

As I said before, I often came to Einstein's lodgings with a theoretical question.

I shall now describe such a visit made shortly after our acquaintance began.

The door of the flat was open to allow the floor, which had just been scrubbed, as well as the washing hung up in the hall, to dry.

I entered Einstein's room; calmly philosophic he was with one hand rocking the bassinet in which the child was lying (his wife was at work in the kitchen). In his mouth Einstein had a bad, a very bad cigar, and in his other hand an open book. The stove was smoking horribly. How in the world was he able to bear it I

Once Einstein was really unable to bear the smoke of his stove. I am told that feeling tired one day, he lay down on the couch and fell asleep. By chance (oh, happy chance!) the professor of medicine, Zangger, came to visit him, and at once recognized carbon monoxide poisoning. The windows were opened, oxygen bombs were procured, and Einstein was saved.

As I mentioned above, his pecuniary circumstances improved after 1911.

Once, I recollect, Einstein could not come to the café with us after the weekly colloquium. He said that his wife had wash-day, and that he had to take care of the baby.

Once, (that was after 1911), I met him one evening at the theatre where he had come straight from the institute. His wife was waiting for him at the theatre, and had brought his supper with her; it consisted of two sandwiches.

At the theatre they were performing a tedious play by Gerhart Hauptmann, "Fuhrmann Henschel", if I am not mistaken.

In the intermission Einstein ate his bread and butter and remarked about Gerhart Hauptmann: "He should leave philosophy to us and give us a strong plot as Shakespeare does."

With every opinion he expressed, he hit the nail right on the head.

I heard Einstein lecturing. The lectures themselves I only understood with respect to their philosophical outlines, but at the same time I began to understand Einstein's soul. Some comparisons will explain what I

learned by listening to his soul. With Faraday it was the experiment itself that stimulated him to think and uplift his soul. Faraday did not need a philosophical conception of the world. Conceptions of a purely qualitative nature aroused by an experiment, caused his soul to vibrate and gave rise to further experiments. The case of Brandes was quite analogous as we can judge from his correspondence. He gained his stimulation from the paintings of great masters.

With Einstein, however, it is a system of philosophy founded on reality which constitutes his starting basis for reflection and absorption. A truly precious gift! He is a philosopher with a strongly developed sense of reality. Highly developed reasoning power builds up the logical structure of the whole.

I once told Einstein the legend about the Indian philosopher deep in thought, who, in the desert, was attacked by a vagabond with the words: "I want your life or your money!" The philosopher replied: "You are not interested in my life, you only want my money and you think that in taking my life you will be sure to get my money too. Therefore why do you say either or?" This reply sounded so convincing to the vagabond that he killed the philosopher then and there.

Einstein listened to the tale and answered: "The vagabond fared badly after all, for the philosopher could not explain to him what he should have said."

Do you, dear reader, perhaps know how the vagabond should have expressed himself?

Einstein's soul swiftly took wing. Increasing success supplied his soul with a feeling of superiority; he developed a generous wit. The sensation of insecurity, his feeling of not being equal to the struggle of life seemed to disappear gradually. Nevertheless his Ghetto-mood would break

through again occasionally. I still can recognize his Ghetto-nature in the genius and spirituality of his eyes looking from the photograph taken during his transition period, which he gave me as a present later on.

As I said before, the helplessness of his soul could already be seen to disappear during his first years in Zurich.

Fully conforming to truth the exalted feeling of his vocation, the Messiah-feelings unfolds itself.

Just as if his success in life, his luck, had to follow as soon as his great achievements had come to light. Occasionally I even mistrusted his high spirits as if I were afraid for him and were already fearing difficulties in the future. I recalled the fate of Ohm after his so important, so fundamental discovery.

George Simon Ohm, born in Erlangen on the 16th of March 1789, summed up his Immortal discovery in his book of May 1827. This book was subjected to a "shattering" criticism by G. Pohl, chiefly, as Pohl wrote, because "it belonged to that class of publications which more because of its tendency than because of its contents is suitable for an especially critical consideration., . The contrast between tendency and contents, between pretension and performance is already shown in a very tangible manner by a comparison of the title and the actual size of the book".

Just the very genius which is displayed by Ohm in the analogy between the phenomena of electric conduction and those of thermal conduction used in the proposition of his law, was jeered at (see "Elektrochemie, ihre Geschichte und Lehre", ("Electrochemistry, Its History and Teaching") Wilhelm Ostwald, Leipzig 1896, page 418).

But not only a fate such as that of Ohm, alarmed me. To be able to work when a great idea is at stake, which has to be nursed to maturity during a longer period of time, a scientist must be unencumbered by cares, must avoid all disturbing conflicts of life, must bear with all humU-

iations from his opponents in order to safeguard that precious something which he bears in his soul. I remember a legend about Buddha.

One time, Buddha, while walking with a friend, was passing by the scaffolding of a house in construction, when suddenly he made a wide detour around the scaffolding. His friend asked him the reason of his behaviour for otherwise he had never been a coward. At this moment a pregnant woman approached, who also made a detour around the scaffolding and Buddha said: "You see, if one is carrying something precious one is not too proud—if a mother has to safeguard her child she accepts every abasement."

Let us assume that the adversary in Ohm's case was an honest man, who was really convinced that Ohm was a good for nothing crammed full of pretensions. But how is one to act if the stone threatening to fall from the scaffolding is a malevolent adversary, who deliberately puts obstacles in the way of the creative work of the genius? Considering this side of academic life I had the worst apprehensions even then, scarcely having advanced to the position of unsalaried lecturer. Here I was a downright pessimist.

I was present when a distinguished middle-aged scientist received a letter from a certain "authority" which read: "If you do not retract the opinion you expressed on my treatise, your career will be made impossible, in other words wrecked."

I have started a conversation with Einstein on these topics several times.

Once, for instance, when our group was on the way to a cafe, I said: "Scientists are not up to much, they lack principle, they always evade the issue." Einstein always knew what I meant and I never had to make lengthy explanations. He answered: "It is not as bad as you think; you are simply a pessimist."

Our friends were indignant over the nonsense with which I detained our master. Robert Heller, one of our friends (a man of deep knowledge), gave me a furious glance.

Another time I re-opened the same topic while climbing a hill alone with Einstein. The way was very tiring and we had to rest every few minutes. After a few preliminary sentences I said: "The more insignificant the achievements of a scientist, the more malevolent and dangerous he is on meeting a man of great achievements. And it is not only envy which is the motive here; he who is intellectually poverty-stricken, thinks himself under a direct menace."

At this moment Einstein's bad cigar, or rather its remaining stump, which he was scarcely able to hold between his two fingers, dropped into the dirt. Nevertheless Einstein picked up the stump again, dusted it, and put it back into his mouth.

I said: "But professor what are you doing?" Einstein: "What about it?" I: "And the microbes which are sticking to the cigar?" Einstein glanced at me quickly and said: "I don't care a straw for the microbes."

His exuberance was increasing. I saw his soul growing.

What is Einstein's conception of reality? His hunger for reality (using the words of Thomas Mann) will be the most interesting to the student of cultural history. Did his soul strive to create a safeguard against the feeling of insecurity by appealing to reality?

First we ascertain the craving for reality shown in his scientific reasoning. Einstein felt, already in his early years, that he would not be able to find solid ground in metaphysics. If one becomes absorbed in his principle of the constancy of the velocity of light, one recognizes that it was bare reality to which he ascribed the property of majesty. Reality is raised to a principle by Einstein while

he denies the independent character of time and space which Kant has stamped as aprioristic forms of perception.

The sense of reality permeates his whole being; we saw above, that Einstein demanded a strong plot from a play.

We approach an understanding of his sense of reality if we compare him to Socrates.

First I want to point out that this comparison contains nothing artificial, for, as we shall soon see, there is indeed a great, unmistakable resemblance between Einstein and Socrates.

Even now when I speak to him I see before me a man on whom neither school nor work have left their traces, a man detached from every dogma, who helps me to find my way through my own thoughts.

"He did not behave like a teacher claiming to possess ready knowledge. He is the investigator, the seeker who wants to find and produce knowledge together with others on a path of joint research and verification . . . He assumes the mien of a pupil as if he were expecting enlightenment and information from his controversialists. In reality he discloses their true ignorance by his cross-questioning and cross-examining, which does not allow one unchallenged word to pass their lips, and at the end the alleged scholars are shown up as ignoramuses."

If some one were to read me these sentences in quotation marks and I were asked to whom they referred, I should answer: "to Einstein, of course!" In fact, however, I am quoting the words of Alois Riehl about Socrates. (*Zur Einführung in die Philosophie der Gegenwart*, (introduction to the Philosophy of the Present Era'), 3. Aufl., Leipzig 1908).

Riehl's opinion about the irony of Socrates also wholly coincides with what I witnessed in Einstein at Zurich. And furthermore: "Whenever he came across a young susceptible soul, he tried, with the love and art of teaching so

characteristic of him, to help its thoughts to come to light and to recognize themselves." So it was in Zurich.

An unlimited ethical influence flows from Einstein. His doctrine and mode of life are in rare accord, in such harmony that we can apply to him Plato's words about Socrates being a man of music, (taken, of course, in the indirect sense of the word).

The dignity of man lies in the fact of his being a free agent concerning his intentions and actions. Insight means power over oneself and this power is a virtue.

"No sentence is so easily proved and illustrated by Einstein's whole life as the one which contends that realization and virtue are one, and that realizing and being moral coincide".

These are the well-known words of Alois Riehl about Socrates; I have only put Einstein's name in place of that of Socrates.

The difference between Einstein and Socrates, and also between Einstein and Spinoza (of which we shall talk later on), starts with the "enclaty" of Socrates, that is, with the restraint over oneself, with the power which rules one's impulses, with the curbing of one's desires and passions, and quenching one's lusts.

Einstein's ethical nature does not originate in compulsion; he very rarely exercises self-control, for instance only in such cases in which he feels obliged to conduct some highly tedious discussion out of courtesy; but even here his passions are capable of breaking through suddenly; and if Alexander Moszkowski says: "Einstein is no problematical character, his 'psyche' does not present us with any problems, for if we analyze it we find no eccentricities", this is due to a misunderstanding. Einstein often tries to hide his eccentricities. A stranger would not recognize it; his abstinence ("enclaty"), however, in contrast to that of Socrates, does not arise from principle.

I shall for the present put aside the question of Einstein's problematical nature, to which we shall return later on. At this point it is most important to emphasize the differences of character between Einstein and Socrates.

Some one once mentioned this familiar sentence in the presence of Einstein: "If one gets up in the morning, and starts telling people the truth, one is sure to arrive in jail by evening." This sentence was expected to arouse Einstein's indignation. But Einstein simply declared: "It surely depends on what end we have in view and it must therefore be done with a purpose."

Wholly in contrast to this conception we recognize in the uselessness of Socrates' death the highest act of his life, of his harmonious nature. Socrates went to his death voluntarily. His fate was dependent on the method of his defense.

Socrates rejected the suggestion of flight put to him by Kriton not only because it would bring him no gain, and would only bring harm to his friends, but also out of principle—it would be contrary to the law.

Einstein's sense of reality would only see in this readiness for sacrifice an element strange to reality, and in this highest memorial of human greatness, Einstein would, to speak in the words of an English poet, only want to recognize a wasted genius and the pathetic uselessness of martyrdom.

Einstein's sense of reality stands out everywhere. Whether it be in his philosophical perceptions, in his system of physics or in his notion of human reactions, we feel the basis of reality everywhere.

The idealistic philosophy which made "to be" an "idea", which regards the "idea" as the foundation of everything, as the ultimate, the insoluble, Einstein rejects. What has no existence in itself, cannot direct the existence

and actions of man, and make them subservient to itself. "Soul" and "spirit" are for him only a limited complex of experiences and sensations.

Quite lately—I here take the liberty of making a flying leap from past years into the present—I was conversing with Einstein about modern, causality-denying statistics (autumn 1931), and happened to mention that Prof. Liebert, when considering the "modern principle of indefiniteness" of "chance", became playful and spoke of a reconciliation between the scientific and the religious conception of the world as follows: "From this point of view even the probability of a "miracle" does not have to be rejected entirely." Einstein remarked to this: "This point of view, which I reject, treats of a field where no laws exist. A "miracle", however, is an exception to a law; and where there is no law, there can be no exception to it, that is no miracle."

With the physicist Eddington, Einstein's so very distinguished adept in the theory of relativity, Einstein does not always agree with all his developments; and if Eddington says that the naive anthropomorphic representation of a spiritual God can never be as far from the truth as a picture of the divine spirit by metric equations, it must be said that this assertion has nothing to do with our knowledge.

I should like to insert a few words about Einstein's geometry.

Helmholtz already has subjected Kant's conception about space that,

1. Space is a form of conception
2. Euclidean geometry is a priori valid

to a strong criticism. Newton was of the opinion that geometry has its justification in mechanical usage and is nothing else but that part of entire mechanics which accurately works out and proves the art of measuring. Now if beside the "physical equivalence" of space dimensions, there

would also exist a transcendental—immediately evident equivalence—the conformity of these two conceptions could only be deduced from experience; if however, a conflict would arise out of these two conceptions, the transcendental equivalence would then be reduced to the status of a hallucination, to an objectively non-existent delusion. (Helmholtz). If Einstein, therefore, deprives geometry of its independence, this is due to the fact that neither geometry alone, nor the laws of physics alone, admit an examination in concrete reality, but may only be applied to the construction of the world when they are indissoluble from one another.

If we now ask by what means the so strongly developed sense of reality was formed in Einstein, we find that this cannot be explained by the educational effects of the books that Einstein read in his youth. It would for instance be wrong to suppose that Buchner's book "Kraft und Stoff" (Power and Matter), which Einstein read in his youth, would have exercised so strong an influence.

As a boy in secondary school for example, I read Darwin and Karl Marx with my friends; in this circle of ours we became quite wrapped up in the teachings of these seekers, which fact, however, did not prevent some of us from becoming clergymen and spiritualists later on.

The genesis of Einstein's instinct for reality can be found in the want of harmony which he felt in his surroundings during his childhood and youth. Later, when he recognized social injustice, and when at the same time the feeling of insecurity developed in him, he appealed instinctively to the solid back-ground of reality and its immovable laws.

Modern psychology would speak here of the "goal of evolution" or the "guiding line" at work unbeknown in every human being, and stamping the character on all his actions and personal experiences.

Freud's psycho-analysis perceives the spiritual personality in a mechanistically effected complex of many physical elements, which are for the greater part localized in the subconscious, and only cause fragmentary images of themselves to rise to the surface of consciousness. Impressions coming from outside effect disturbances of the equilibrium already in early youth and, especially if they are pushed down into the subconscious, they may cause great damage. Freud therefore demands that in such cases they should be lifted into the conscious where they may be rendered harmless.

From "psycho-analysis" there developed "individual psychology" with its teleological conception of the "guiding-line". If we want to understand a human being so as to be able for instance to influence him, his guiding-line must be discovered. Since it is in his subconsciousness, however, one must be guided by the symptoms which represent it in the conscious. These symptoms are often deceptive however. And in this respect I must confess that I was often puzzled when I wanted to explain Einstein's soul to myself. This will receive considerable mention later on.

It is important to follow Einstein's disposition, talents, and interests from the standpoint of his sense of reality. Modern psychology ascribes a dualistic character to the disposition. So we read in William Stern's "The Human Personality", (publshrs. J. A. Barth), that "every individual disposition is uniformly 'directed' and appropriately 'equipped'; it is only both these factors together which decide its teleological character. Thus, to mention only one example, the quality of imitability is characterized, on the one hand, by the inclination to imitate, and on the other, by the ability to produce modes of action and appearance which are similar to those perceived in others."

Eventhough the "direction" and the "equipment" are dependent on each other, they nevertheless possess a

certain Independence from one another. The relation between "willing" a thing and being "able to do it", says Stern, is only a small part of the much more general relation of the direction of the disposition and the equipment of the disposition. This relation characterizes the three principal forms of intellectual wealth, namely genius, talent, and intelligence.

It is the "direction" that marks the substance of a genius. We can recognize the impulse of creation, the suffering over the problem, the creative mission.

This force of the "direction" dominates what "equipment" may exist; difficulties are overcome and capabilities are awakened,

A talent does not, any more, contain a mission which surpasses everything, but there exists a "prevailing interest" concerning a certain field. In the case of intelligence, there is an equipment present, but it represents something indifferent, since there is no direction.

All this becomes particularly important if we consider that a personality may possess a direction and interests in a case where every equipment is missing at the time, or still more, when even talent is totally absent.

There is a general opinion that Einstein developed a great interest in mathematics while still a mere child.

I believe I can contradict this. In his early youth his interests were almost entirely directed towards natural science. In the years 1910—1911 a young mathematician belonging to our circle, a Pole by the name of Straschewicz, several times pointed out to Einstein certain mathematical mistakes in his work and Hopf, who was his assistant at that time, even said on one occasion: "Einstein has no idea of mathematics." This was an exaggeration of course, but it was a fact that Hopf, as an expert in hydraulics, was better versed in the field of mathematics. I also remember that once on our way to the cafe, one of our

crowd (Robert Heller) asked Einstein why he was doing so little work in mathematics. Einstein modestly replied: "Why should I work in a field where I cannot produce anything creative?"

But, with time, everything became different: the further development of the theory of relativity demanded from Einstein a greater and greater versatility in the field of mathematics. Great mathematical ability was soon awakened in him; it became evident in a short time that Einstein not only was able to utilize the highest regions of mathematics scientifically, but was also himself the originator of new mathematical territories. At the same time his pedagogic outlook suffered a change. In the following chapter I shall make mention of Einstein's note to young people, wherein before all, he recommends the study of mathematics.

What most surprised me in the years 1910—1912, was the circumstance that Einstein was immediately able to express any scientific problem in mathematical language, for instance in the form of a differential equation.

The conceptions I had formed in analogy to Einstein's particular theory of relativity about "non-preferment of systems in electro-chemistry", were with Einstein's aid worked out to a differential equation which represents the fundamental equation of my theory of "non-preferred systems in electro-chemistry". (See my book published with a preface by Einstein: "Grenzflächenvorgänge in der unbelebten und belebten Natur", ('Limiting Surface Phenomena in Inanimate and Animate Nature') ,Pbbschrs. A. Barth, Leipzig, page 346 and foot notepage 350).

We must not believe however, that Einstein's sense of reality always made him choose the right path; it often put him on the wrong track. If Einstein expresses an opinion about some one, one often has the feeling about this judgment, that he is looking for a concrete something

from which he then tries to sketch the portrait of this person. One is then very much astonished to see that the success of the person in question very often represents the starting point of Einstein's reflection. One has the feeling that Einstein is not in earnest, that he is pretending to belong to the average mass.

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Above all, his simplicity and gentleness of character must be stressed.

I often heard, especially from women, that Einstein was a child. His laugh, even now when he is *in* his 53rd year, has a childlike ring. It is my opinion that Einstein's depth of feeling and spirituality are the factors which preserve his pureness of soul, but on the other hand prevent him from acquiring that faculty of adaptation to commonplace, every-day life, which makes a man appear mature. Perhaps we can make a purely formal approximation of this slow maturing by that law which states that the more highly developed an animal, the longer it takes to mature; while a one year old dog has attained full maturity, a man needs several years to be equipped for life.

We must not conclude, however, that Einstein always appears as gentle as a child. As I mentioned before, Einstein is endowed with all the human passions.

Let us now take up Einstein's depth of emotion. It is the cause of his devotion to his problems, the cause of his questing, brooding nature, the cause of his continued, incessant research. I shall never forget how once during colloquium, when the discussion was as good as finished, Einstein suddenly exclaimed: "What is light?" Deep silence followed. We did not want to disturb the thoughts of the master.

If you tell Einstein of a tragic occurrence which arouses his sympathy and you happen to catch his eye, you will find there a wonderful compassion, which you will never

**forget. You have the feeling** that the story is more tragic and more important than even you yourself had realized.

But quite in keeping with this, Einstein can express a strong dislike, and can fly into a passion, becoming intolerant and even unjust.

When a Berlin family stayed at my house some years ago, and my guest who belonged to Einstein's circle of acquaintances became absorbed in Einstein's pictures and notes, he said: "It is strange how Einstein immediately reacts if something is in the least objectionable from the moral standpoint." I did not quite agree with this characterization and remarked that Einstein could also object exceedingly and display a violent reaction, if the case in itself was quite innocent, but did not appear so from his own personal viewpoint; one should then simply explain the real facts of the case to him. It is important that Einstein is always true to his principles, that his soul is incorruptible, that we can indeed rely on his integrity; here lies the reason why one wants to win him over to one's side, why Einstein represents the conscience of the world around him.

What is intolerance? The question is, what is the genesis of a strongly objecting, negating, destroying conduct in one human being towards another?

Our imagination cannot picture a man of higher ethics or higher morality than Socrates.

Socrates taught that it was better to suffer an injustice than to be unjust oneself. And with Socrates, this was no empty phrase. Every one agreed, that Socrates really lived up to his ideals. He would indeed suffer every injustice, but never permit himself to be unjust. Life however is so organized that a man who does not want to humiliate others has to suffer many, very many humiliations himself. And the life of Socrates was hard and full of afflictions. This, however, did not prevent St. Augustine from asserting:

"virtutes gentium splendida vitia sunt." (The virtues of the heathens are only effective vices.) (See Leo Schestoff "Potestas Clavium".)

Morality is intolerant, putting forth greater claims than is generally assumed. It was morality which demanded a sacrifice of Brutus, and what is more, a human sacrifice. Morality, says Schestoff, is sterner than the pagan gods. While a pagan god was normally satisfied with a goat or a ram, morality sometimes demands human victims and not only one man, but several; and it is not satisfied with any man, but demands the most valuable. Why does morality need such sacrifices? Morality has only one answer: Sic volo, sic jubeo—sit pro ratione voluntas!

By the way I want to remark that if I speak of Einstein's intolerance, I do not mean that intolerance which one religion or some scientific tendency shows towards the other respectively. In this respect, Einstein is tolerance itself; he listens to and becomes absorbed in every point of view contrary to his. He is only distressed if his theories are attacked in an unscientific manner.

His intolerance is of a purely emotional character.

Possibly he feels wounded. Perhaps he is grieved by a lack of "scientific cleanliness" (as he sometimes expresses himself). An older student, who worked on his dissertation under Einstein, and at the same time attended Einstein's colloquium, once said: "Einstein is out to vex us all."

Here and there in this period described, one of us would get into Einstein's bad graces. This was manifested by Einstein keeping away from the person in question, sometimes casting a surprising glance at his victim, a glance which lashed more violently and was able to inflict greater spiritual punishment than the legendary flash from the eyes of the irate Indian god.

A Mr. X. gave a reception in Einstein's honor; about twenty guests were invited. When Einstein entered, I felt

already from a distance, that he was in a bad humor and soon it seemed to me that his ill-humor concerned myself; at any rate I soon ascertained that this time his glance of repulsion was intended for me. Nevertheless, I tried to find a seat near him.

Probably, however, he found the neighbours on the other side to his liking. Einstein began to talk and even laughed several times. But nevertheless I felt him glance at me with repulsion now and then. At the same time (what a contradiction!) he was telling his neighbour in a low, childishly gentle voice, that he could not eat chicken on account of his having played with the chickens in the court-yard.

Never has a human soul seemed so contradictory to me as his did at that moment. Why? Because I felt that the lower his voice and the gentler his narration, the greater became my feeling of injury?

It is said that the greater a man's dilemma, the more intense are his thoughts. My brain was seething with rage. How should I parry those chickens of his?

And I finally said this or something like it: "In contrast to what you have just told us, Wells asserts that the culture of the Mars-inhabitants is much greater than that of the human race, that the Martians do not regard us as human beings at all; if a Martian needs food he snatches a man up to his tower with a long pair of tongs, sucks his blood with an apparatus especially constructed for this purpose, and then just drops the man off his tower again."

Einstein was quite transformed. He said: "An interesting idea." The looks he cast at me were quite different. He was not yet friendly, but he did not repulse me any more. Thought dispersed the clouds of his soul.

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It should not be supposed that it was only during the last years that Einstein was much pursued, and that his opinion was asked in fields more or less unknown to him.

In the period described just previously, people were very interested in finding out Einstein's opinion of right and wrong on the most varied subjects, such as in the field of political economy or psychology or that of philosophy or history.

Only the inquiring circle was narrower then; it was made up mostly of his friends and more intimate acquaintances who wanted to hear his criticism on various questions.

One case where Einstein was asked to advance an opinion about Freud's psycho-analysis, which evidently interested him only very slightly, I shall never forget.

One fine summer evening Einstein's friend and co-worker, whom we shall call Y., delivered a lecture on psycho-analysis somewhere, and insisted that Einstein come to the lecture and give his opinion on the subject.

As Einstein finally went to the lecture, I went too.

The lecture—hall was full. The audience consisted chiefly of young men and women, who had come to be enlightened about questions of love and their effects on the subconscious, and on questions of psycho pathology in everyday life.

I saw that Einstein had slight interest in the subject of the lecture. Perhaps he was wrapped up in his physics problems. Now and then his glance remained with pleasure on the face of some young girl.

After the lecture the speaker insisted on hearing Einstein's opinion.

Einstein replied coolly and soberly, that as regarded himself, he had first to consider whether psycho-analysis was a science or not—and before this was proved etc . . .

The speaker would not give in, and asked us to go to a cafe to talk this question over at greater length. It was about 10 o'clock in the evening. Besides Einstein, Mr. Y. and myself, there were with us two sisters B. and the husband of the elder sister B., a student of the University at

Zurich. The sisters B. had come to Zurich from a Slavic country to study natural science; both were of rare beauty and charm of deportment. The elder one had married a German student after her second term, and considered her studies as ended to a certain extent. The younger one was still studying. But it was her eyes which made the study of stern science a difficult thing for many young men.

In the cafe, Y. continued the discussion about psycho-analysis.

With great enthusiasm Y. tried to prove that psycho — analysis was a strict science. Einstein was bored. But Y. kept on talking. Then suddenly I could not help noticing that Einstein evidently had a greater interest in living eyes than in the psycho-analytic problems of his friend. Y. had not yet perceived the change which had come about in Einstein's attention, and was continuing with his proofs.

Suddenly he noticed the direction of Einstein's glances and perceived at the same time that Einstein had not listened to a word of his explanations. Y. indignantly threw a book on the table and said: "Why professor, if you were in love you would believe that more important than your quantum theories". Einstein replied in a gentle, somewhat embarrassed voice: "No, ladies and gentlemen, my quantum theories are really of great importance to me."

Einstein threw me a glance as if he needed my confirmation that he was right.

Certainly Einstein is right: much can be said in objection to an incessantly talking psycho-analyst; but Thomas Mann was also right when he said that there was really no objection which could be raised against a handsome lady, who held her tongue besides.

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My friend, Professor Baur, wanted to make Einstein's acquaintance. I mentioned this to Einstein and gave a description of the good qualities of my friend. Einstein said:

"Let us go to his house at once." He said this so promptly, and spoke so unconventionally, that even I who knew him, was astonished. It was in the afternoon. Perhaps Baur would not even be at home at this time; perhaps he was busy; and it would be better after all, to come to an understanding with him about the time of the meeting. Well, we did come to an agreement. Einstein walked past my house at exactly eight o'clock, and we went to a small cafe where Baur was expecting us.

I shall now describe Professor Baur's impressions on this occasion. He was overwhelmed by Einstein's quality of emotion, by something direct which radiated from him, by his spirituality, but particularly by the ease with which Einstein produced the most intricate problems "out of his hat" so to speak. "How can he possess so much knowledge of scientific literature at this early age?"

Later on when Max von Laue came to Zurich and delivered a lecture on his famous work concerning the interference of X-Rays, Einstein began the discussion from his seat after the lecture and became the "nervus rerum" of the discussion, giving both substance and soul to the lecture. Everybody left the lecture filled not so much with what Laue had said, as with the remarks Einstein had passed on it. I walked beside Professor Baur and he repeated what he had said at the time of making Einstein's acquaintance at the cafe: "Einstein extemporizes on the most intricate problems of physics with as much ease as if he were talking about the weather. Others need a lot of time and have to work hard to merely understand and digest every one of these problems he was talking about." It can be imagined with what intensity Einstein must think, if every problem of the day that one wants to talk over with him is already so promptly worked over in his thoughts, that the inquirer, to his surprise, gets an already complete answer when he

had thought it would be necessary to have to initiate Einstein into his particular work.

This latter remark I later heard from a Prague physicist who was working in a rather remote field of physics. He told me of his astonishment when he had visited Einstein, and had found that Einstein was universally conversant with his line of work, and already had conclusive thoughts regarding it. It is no wonder that a pilgrimage of physicists and theoretical chemists to Einstein soon started, which in later years at Berlin, assumed enormous proportions.

In colloquium meetings I made the acquaintance of a friend of Einstein's, a Mr. B., who had come to Einstein from Bern. Decidedly, B. is a fine, deep, very upright, and also very talented personality.

After a time B. began to work on the theory of relativity with Einstein. But here Einstein was very exacting; he was obviously dissatisfied with B., and left him to his fate.

Later on, during the war, the great theoretical physicist, Professor Abraham paid a visit to my laboratory.

During the course of our conversation, Abraham asked: "Who is B.?" After answering, I added that B. was one of the most intimate friends of Einstein. Critical Abraham said: "But B. looks as if the whole world had formed a conspiracy against him. Has this any connection with this friendship?" I did not feel equal to answering this question.

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To the world of scientists, Abraham's attitude of refusal towards the theory of relativity is not unknown. If one wants to make an accurate judgment of this however, one must not forget that Abraham, who died young, expressed this opinion in the first years after the publication of the theory of relativity. I am firmly convinced that if Abraham were living now, he would have changed his opinion.

Especially the recognition of the general theory of

relativity advanced slowly. When Einstein lectured on its first elements during colloquium, Max von Laue, who was present, would not agree with the theory. Einstein replied playfully: "It is not at all necessary that every physicist should agree with it!"

Today Laue belongs to the most devoted partisans and best friends of Einstein. Another time we had Professor Ehrenfest, who occupies Lorentz's chair of physics in Holland, as a guest during colloquium. After Einstein's lecture, Ehrenfest, retaining his seat, remarked: "It is strange that Einstein always gets the results he wants from his work."

It would lead too far if I tried to explain the meaning of Ehrenfest's words here, especially if we consider that today Ehrenfest belongs to Einstein's admirers and best friends. Therefore it can only arouse our indignation if in the book "A Hundred Authors against Einstein", Leipzig 1931, Ehrenfest is also mentioned as one of Einstein's opponents.

As far as I personally am concerned, I was constantly aware of Einstein's superiority to me. Of course I had my own scientific problems, my own hypotheses and theories, and already in early life felt myself an independent investigator. But when working over my problems I often came into contact with strange fields adjoining physical chemistry, and there, for the first time, a doubt arose in me as to whether my hypotheses were not in opposition to already firmly established achievements in these adjoining fields.

Here Einstein was marvelous. Often a half hour discussion was enough to clear up the whole matter. I frequently fell into a state of intellectual bondage towards him. This was all the more remarkable as I had always been the independent one, the leader of research among my co-workers in the field of physical chemistry, and already while I was an assistant in Leipzig, was the stimulating advisor of my Leipzig professor.

To understand this excessive influence of Einstein over me and some other young research workers who were then closely connected with him, one must take into account the fact that Einstein's critical remarks, his objection to a respective train of thought often came unexpectedly during a walk or in the cafe, in the midst of a quite different, unimportant conversation. Often his objection came in the form of a joke or in a jesting tone. His joking, his good humor, his wit, were beyond description. It must be taken into consideration that it was not a case of relations between pupil and teacher. They were much more intimate, more friendly. Einstein often spoke about quite intimate subjects and this not only when one of us was alone with him, but on walks where four or five people were present. I shall never forget his conversation on a certain mountain tour which took a whole day. It is interesting that as soon as a colleague of his own rank — a Zurich university professor, for instance Professor Zermelo—was present, Einstein became more reserved. Of course we also poked fun and laughed, but the conversation did not overstep a certain limit. With us, who were really only a few years younger than he himself, he was much more free and unconstrained. The feeling of a social distance between us who were assistants (only a few of us were unsalaried lecturers at that time) and himself, was as that time unknown to him. It was only later on, in Berlin, that this feeling of distance became noticeable.

His delicious, almost childlike unconstraint, his frank, open nature, together with his intellectual superiority, never failed to affect us.

Schopenhauer says that only animals possess their full measure of ease and sincerity, that there is only one mendacious being, and that is man; every other creature is true and straightforward.

We read in Schopenhauer: "What a strange pleasure is

offered to us by the sight of any free animal as it goes about its business alone and unhindered, hunts for food, tends its young, and keeps company with its equals, being, all this time, just what it should and can be."

I cannot find words to express what a state of satisfaction, even happiness, it put me in, when a hypothesis set up by me found Einstein's approval. Then the work gave a spurt, then I looked into the future with confident eyes!

Altogether I gave three lectures in Einstein's colloquium. I remember my second lecture especially, at which not only my colleagues, but also the students who were working on their dissertations with me, were present.

Einstein's support of my principle of displacement strengthened my position as a scientist in Zurich at that time. But at the same time—as it always is in such cases—it also made many people my enemies.

In general I can say that during that time at Zurich Einstein was ready to enter into any scientific discussion, especially if he was interested in the subject; as he once remarked, he learned something in this way.

His first treatise in the "Zeitschrift für Elektrochemie" dates from the year 1907, and bears the title: "Theoretical Remarks on the Brownian Movement". In the following year (1908) his treatise "Elementary Theory of the Brownian Movement" was published. It begins as follows: "Professor Lorentz once pointed out to me, in conversation, that an elementary theory of Brown's movement would be welcome to many an analytical chemist. Acting upon his suggestion . . ."

It is here the question of Richard Lorentz then professor of physical chemistry at the Zurich Polytechnic.

After 1912 Einstein often went to Holland, to Leyden, where he gave lectures. The personality of H. A. Lorentz attracted him there. It is strange how Einstein spoke of H. A. Lorentz! In spite of Einstein's surpassing the research

of Lorentz while still quite young with his particular theory of relativity, he spoke of Lorentz with a reverence and admiration as if he were his teacher. With the Berlin professor, Planck, Einstein was in correspondence ever since his years in Bern. At that time the following joke went around in Zurich: "There are three physicists in the world: Einstein, Planck and Lorentz; what these three men write and discuss with one another, no other man on earth can understand; they only understand it among themselves."

In 1912 or 1913, Einstein made a friend of Professor Paul Ehrenfest, the successor of H. A. Lorentz to the chair of theoretical physics at Leyden.

When Einstein went to Leyden for the Easter holidays in 1914, I received my first post-card from him.

It was an artistic post-card, colored blue, and bore the post-mark 27. 3. 14. Einstein wrote: "Dear Mr. Reichstein, I was very pleased with your exceedingly amiable letter. Excuse my mistake in the time stated. Pleasant holidays and good results in your work for you, is the wish of your Einstein."

During his epoch-making discoveries, and the discussions and lectures concerning them in Leyden, he had remembered that before his departure from Zurich he had given me a wrong date about some unimportant matter.

During the war while he was active at the Prussian Academy of Sciences, Einstein came to Zurich several times, and I was able to continue my conversations with him.

How morally indignant he was about the point of view with respect to war shown by his Berlin co-workers! In the national fanaticism arising everywhere, Einstein saw, in addition, a serious danger to European civilization. Every country was breaking the laws of ethics, and every country did it in the name of justice. The highest achievements of culture, the highest achievements in chemistry **and** techni-

cal science were placed at the disposal of the demon, war. I ascertained a change in Einstein's soul, which, as we shall see further on, afterwards assumed sharper outlines.

In 1916 Ernst Mach died. In the "Physikalische Zeitschrift" Einstein wrote: "A consideration of Newton's pail-experiment shows how close the demands of relativity in the more general sense (relativity of acceleration) were to his **mind.**"

As we shall see in the last chapter, the general theory of relativity is based on Einstein's recognition of the essential nature of the proportionality between heavy and inert matter. Experiments by Eotvos have proved this proportionality with an accuracy up to 0.00001%. Upon this Einstein based a scientific structure of vast dimensions, a mental sky-scraper of enormous height, i. e. his mechanics based on the parallelism between the law of gravity and the law of inertia of matter.

Mach had already demanded that a relative character should be ascribed not only to uniformly directed and uniformly occurring movement, but to any kind of movement and thus also to a movement of rotation. The centrifugal forces which arise from the rotation of the earth about its own axis and which lead to the oblateness of the earth, to the reduction of gravity at the equator, to the rotation of the plane of Foucault's pendulum etc. etc., are therefore of a relative character. In other words they should also occur if the world were at rest and all the other celestial bodies moving around it, so that the same relative rotation would be accomplished.

Mach demanded that the principles of mechanics should be so far changed as to allow centrifugal forces also for relative rotation.

Thirty years later, Einstein put Mach's thoughts **into** action. We shall see later on that the triple alliance,

Mach—Einstein—Minkovski has produced a change in the interpretation of the world. I shall only mention in a few words that the mathematician Hermann Minkovski gave to Einstein's particular theory of relativity so harmonious a form as has never been attained by any physical theory, so that in the end the relativistic treatment became the most intelligible and mathematically simple. (See Hans Thirring: "Die Idee der Relativitätstheorie", 2. Aufl. Springer, Berlin 1922, page 69).

Here we are chiefly interested in Mach as the predecessor of Einstein.

We cannot imagine Einstein's construction originating from Mach's thoughts by a logical path. Besides, stress must be laid on the following: if a theory which is superior to all the others seems unavoidable, this arises from our recognition of the best which we "can go no better"; the possibility is not excluded, however, that a theory following upon it will only represent it as an approximation, a special case. Newton's theory is only a special case of Einstein's mechanics.

In his address to Planck (at Max Planck's 60th birthday in 1918), Einstein said:

"Development has shown that of all the possible theoretical constructions, only one in each case proves itself absolutely superior to the others. No one who has really studied the subject will deny that the world of perceptions gives a practically uniform definition of the theoretical system, in spite of the fact that no logical path leads to the principles of the theory." Especially with respect to the problem of forerunners and its logic, it must still be pointed out that not only in science but also in art, a forerunner not only exerts an influence but sometimes is really decisive for the creation of the artist even if the work done by the successor is greatly superior to that of the forerunner.

In his youth, Einstein struck up a friendship with Friedrich Adler.

From what I heard in Zurich at that time, I can form the following idea of this friendship.

Friedrich Adler was not only a physicist, but also took a lively interest in the social democrat concepts. During those years the Russian and German social democracy not only attached much value to historical materialism, but moreover to a philosophical conception of life, and it was before the positivistic tendency of Mach, Avenarius and Verworn that was discussed in these countries. The friendship between Einstein and Adler was nourished from Mach's world of ideas. Soon Einstein could not help recognizing that Mach's thoughts were of too great importance to be used only to serve a general positivistic direction.

Si duo idem faciunt, non est idem I (If two do the same thing, it is not the same) Here I cannot continue without mentioning Einstein's cooking pots. Einstein writes:

"I am standing in front of a gas stove. On it there are two saucepans standing side by side, of which one may easily be mistaken for the other. Both are half filled with water. I perceive that steam is continually emerging from one, but not from the other. I am surprised at this, even if I have never caught sight of a gas stove or a saucepan before. Then, if I notice something bluish and luminous under the first saucepan, but nothing under the other one, my amazement disappears even if I have never seen a gas flame before. For I can only say that this bluish something causes the escape of the steam or at least probably causes it."

This bluish something were Mach's thoughts and the boiling pot was Einstein's soul.

The congeniality of souls between Mach and Einstein was also evinced by the characters of these two geniuses. (Besides an unselfish striving after truth, they both possess a high degree of humanness. Both of them are pacifists]

Einstein wrote about Mach ;

"With him the direct enjoyment of perception and realization, Spinoza's amor dei intellectualis, was so strongly predominant that up to old age he looked into the world with the inquisitive eyes of a child, ready to enjoy, without further desire, his comprehension of the various relationships existing in it\*'.  
\*'"

This being "without desire\*", this unselfishness in investigating the laws of the universe, which, as we shall see further below, Einstein qualified as cosmic religion, is no less characteristic of Einstein himself.

In order to make a study of the relationship of souls in the triple alliance Mach—Einstein—Minkovski, it is expedient to consider such a congeniality in the sphere of art, where, as it may seem at the first glance, it is a question of mere congeniality of emotion.

I shall therefore choose for comparison some artists with whom the forerunnership is sharply pronounced. There has been much written for instance about the congeniality of Homer—Dante—Goethe. We see in the Divine Comedy that Dante's pictures of the life to come, are strongly linked with Greek and Roman tradition. (See for instance Otto Kahn: "Dante, His Poetic Work and His World"). In Homer the soul leaves the body after death, and wanders to Hades where it leads a shadowy existence, Vergil in his Aeneis already interprets this conception of Homer's in the way that, even after severance from the human body, stains and defects still adhere to the soul in order to remove these stains, Vergil makes the soul do penance in the nether world and cleanse itself by wind, water and fire. The purified souls then come to the river Lethe where they drink the water of oblivion to prepare themselves for entrance into another mortal human body.

Dante describes the flight of the souls after death to the banks of the Acheron or Tiber. There, together with the

atmosphere, they form a body which bears a certain resemblance to the forsaken earthly body, but is described as a shade. The shades regain all their senses, they speak, laugh, weep, and sigh.

In Homer, Odysseus in Hades wants to embrace his mother and reaches into nothingness. Aeneas has the same experience with his father Anchises. Dante also, on entering purgatory, wants to embrace the shade of his friend, the musician Casella, and thrice reaches into emptiness.

While the shades have no weight, Dante's weight causes the ferry of the infernal ferryman, Phlegias, to dip deeply into the waters.

When Dante is walking, he pushes aside the pebbles on the ground of hell, a thing the shades are not able to accomplish. The shades perceive that Dante is breathing. Dante's body, in contrast to those of the shades, transmits no light. The reader will notice that it is here not only a question of a similarity of sensory perception and reproduction of pictures—Dante has not even changed the names of the characters in the Greek nether world and at the gate of hell we find old Acheron again—but also of an approach between two entire philosophies.

Goethe has also been strongly influenced. Goethe conducts Faust through "the wild life". He makes him "stare, fidget, and stick fast". Mephistopheles drags Faust through the heights and depths of life, through college-life in Auerbach's cellar, through the contemplation of nature, through Gretchen's tragedy; he makes him join in the Witches' Sabbath of Walpurgis night; he drives him towards self-oblivion.

We here recognize the leadership in Homer and Dante; we recognize the old conception of life that oblivion must precede the starting of a new life.

Just as it is not only a question of the similarity of feeling alone in the case of Homer—Dante—Goethe, so

with Einstein—Mach—Minkovski, the connection is not a purely mental one.

Scientific research work is carried out in a very intricate manner. One gropes in the dark of the unconscious. One looks for analogies. One thinks in one's sleep. Einstein once said to me: "One has to put oneself in a somnambulistic state to be able to follow out this train of thought". (At that time it was a question of Bohr's atomic model.)

Modern psychology goes so far as to admit only one simultaneous trinity of each experience.

We read in Friedrich Jodl ("Lehrbuch der Psychologie", 3rd. Edition, Stuttgart and Berlin 1908, vol. I, pages 170—184): "Sensation, feeling, striving are not three different capacities or forces, but only three different forms and manifestations of the general procedure of primary psychic reaction in man". And further: "Sensation, feeling, and free will being in an unbreakable dependency on one another, exert a reciprocal regulation, and continually supply each other with new force."

In the following phase the differentiation appears, which however does not annul the inseparable co-Operation of the three functions in the activity of consciousness. Feelings of joy and suffering also cannot exist alone, but are either connected with sensations or with conceptions or ideas.

## CHAPTER III.

# Memories since the Year 1920.

In the autumn of 1919 I returned to Western Europe, set up housekeeping in Leipzig where I continued my work, and visited Einstein in Berlin in the beginning of 1920. The external circumstances of his life were very much changed. In comparison to his former accommodations, the visitor was surprised by his pleasant surroundings and the beautiful study, which at that time was next to the sitting room. (It was only later that the study was moved to the attic of the same house.) The order and beauty of this home revealed the presence of an efficient, intelligent, and loving feminine hand. I made the acquaintance of his present wife, Mrs. Else Einstein, who is also Einstein's cousin. It was apparent immediately that this woman was fully equal to the task of being at the same time a wife to him and linking him to the outside world by acting as a go-between.

In Einstein himself I could see no change on the occasion of my first visit.

Something which was new to me however, was the unexpectedly violent indignation with which he described the censure which the rector of the Zurich University had publicly expressed against him.

The story itself was not new to me as I had already heard it from my friends. During the war Einstein had been invited by the University of Zurich to hold several lectures there. **For** admission to these lectures the university sold tickets which were not available to all pocket-books. Before admission to the lecture hall, all visitors had to

such as H. A. Lorentz, M. Planck, Sommerfeld, Laue, Born, Larmor, Eddington, Debye, Langevin, Levi-Civita, who all support the theory of relativity, and, for the most part, have themselves added valuable contributions to this theory.

As a physicist of importance, who at the same time is in opposition to the theory of relativity, only the experimental physicist Lenard can be cited. Einstein admires Lenard as a master of experimental physics, but at the same time stresses the fact that Lenard has "not yet achieved anything" in the field of theoretical physics, and that his opinions on the general theory of relativity are so superficial that he, Einstein, did not deem it necessary to go into them any further.

With regard to the accusation of unethical advertisement of his theory of relativity, Einstein replies that he has always been "a supporter of sober, thoroughly deliberated speech and terse description." "I get goose-flesh if I hear bombastic words or phrases whether they happen to be about the theory of relativity or about anything else."

Einstein now outlines his position with regard to the lectures of Weyland and Gehrke.

Whether Mr. Weyland is a colleague, he does not know. Is he a physician? An engineer? A politician? Einstein was not able to ascertain this. Weyland's lecture was not to the point and consisted of insults and base accusations.

Mr. Gehrke attempted by his lecture to create a false impression in uninformed laymen by an incorrect statement of the theory of relativity, by misrepresentation, and by a biased selection of material.

Among other things, Mr. Gehrke attempted to prove that the theory of relativity represented a step on the way to solipsism, which is designated by Einstein as a deliberate attempt to mislead the lay public.

The arguments of Mr. Gehrke are based on the objec-

tions of Lenard, which, to a certain extent, have been founded on examples of every-day mechanics and are refuted by Einstein's pointing out that the statements of the general theory of relativity are the nearest approach to accordance with the rules of classical mechanics.

Einstein remarks that at his instigation, the impending meeting of Natural Philosophers at Bad Nauheim is to hold a discussion on the theory of relativity so that any one "entitled to appear before a scientific forum" may take part there and bring up his objections.

In conclusion, Einstein points out that it is likely to create a strange impression in the eyes of outside colleagues, and especially in those of the Dutch and British co-physicists H. A. Lorentz and Eddington when they learn that "the theory and its originator are slandered in this way in Germany itself."

To characterize the feeling which at that time had developed in Berlin on this basis, I shall reproduce an article in a small daily paper, which refers to the "Berliner Tagblatt".

"Albert Einstein wants to leave Berlin."

In the "Berliner Tagblatt" we read as follows: "The personal charges which were brought against Dr. Albert Einstein in the "Working Community of German Natural Philosophers" have met with a success which is extremely mortifying for Berlin: Albert Einstein, disgusted by the attacks of the all-Germans and the pseudo-scientific methods of his opponents, wants to turn his back on the capital of the Reich. Such is the value set on spiritual culture in the Berlin of 1920! A German scientist of world fame is hounded out of the city which believes itself the center of German mental culture."

The "Berliner Tagblatt" then published a statement by three professors from the Berlin university, namely von Laue, Nernst and Rubens, which, as it is of historical importance, I shall reproduce here word for word:

"In yesterday's meeting in the Philharmonic, in which Einstein's theory of relativity was to be illustrated, not only objections to his theory, but, to the greatest regret of the undersigned, also remarks of a spiteful nature against his position as a scientist were made. We cannot take it upon ourselves here to go into the inimitably deep mental work which brought Einstein to his theory of relativity; surprising success has already been achieved, its further evaluation must of course be left to future research. On the other hand we want to stress that which received no word of mention yesterday, namely the fact that quite apart from Einstein's relativistic research his other works have already claimed for him an eternal position in the history of our science; thus his influence on the scientific life not only of Berlin but of entire Germany can hardly be overrated.—Whoever has the joy of being close to Einstein knows that no one surpasses him in respect for the mental property of others, personal modesty, and dislike of advertisement. It appears to us that justice demands an immediate voicing of this conviction, all the more since no opportunity was offered for this yesterday.

von Laue. Nernst. Rubens."

I shall now proceed to the discussion on the theory of relativity at the meeting of the German Natural Philosophers and Physicians in Bad Nauheim, and this in the manner in which it was then reproduced by the impartial correspondent of a daily paper. Perhaps this reproduction will not be intelligible to all readers, but it is nevertheless not only correct, but also characterizes the course of discussion at that time. This consideration is the reason for including the discussion here rather than in the last chapter.

"Discussion of Einstein's theory of relativity. The combined physics and mathematics departments discussed the theory of relativity on Thursday. First lectures were held by the gentlemen who had received an invitation **from**

the German Physics Society. Weyl—Zurich, spoke on an elaboration of the theory of relativity worked out by him, which also considers the electrical phenomena and explains them on a general basis. After this, Mie-Greifswald demonstrated the calculation of a specific problem which stressed the relativity of gravitation as compared to general relativity. Then Laue—Berlin deduced the deflection of a ray of light and the displacement towards red of the lines of the spectrum in a field of gravitation on the basis of the theory, and finally, Greve—Bonn reported on his measurements carried out together with Bachem, actually showing these displacements towards red of the lines of the spectrum in the sun as demanded by the theory. The following discussion had to be strictly limited to the subject matter of the lectures themselves. Only after its conclusion, a general discussion of the theory of relativity was entered upon. Since Mr. Einstein was given the word immediately upon all objections and questions raised, the discussion took on a very lively nature and was dominated by that between Einstein and Lenard—Heidelberg.

Lenard avowed himself a disciple of the particular theory of relativity according to which a perfectly regular translation-motion is supposed to be entirely unrecognizable and we cannot decide whether, for instance, we ourselves are engaged in a rotating motion or whether the entire world is rotating about us or whether, when we are severely shaken by the sudden arrest of a moving train, we receive this shaking by a change in the motion of the train or rather by the corresponding opposite motion of the earth. The latter, according to his opinion, represents a contradiction for any normal human brain which a physicist needs and must use as much as any one else. Likewise, the denial of the ether (atmospheric envelope of the earth) on the basis of the theory of relativity is rejected by **Lenard**, who, on the **contrary**, believes its presence undeniably

proved by the fact that without it we cannot convincingly explain the phenomena of physics as the mechanical phenomena of motion—a demand which is necessary to gain a clear idea of these occurrences.

With respect to this latter remark Einstein replied that those things which a human being considers as concrete or not concrete have changed considerably with the course of time, and that physics happens to be abstract rather than concrete in its essence. To the contemporaries of Galilei his mechanics were doubtlessly very abstract, while of late, and in fact long previous to the theory of relativity, we have considered electric fields the most elementary pictures with which we work; to the worker in electricity the electric field is a most concrete conception which cannot be surpassed, and there are some to whom certain mechanical phenomena are only concrete by reference to the electric fields. With regard to the arrested railway train it happened to concern the reciprocal effect between this and all the other masses present in the world, whereby it was quite immaterial which of the two was moving with respect to the other. That to operate with a normal human brain was very dangerous. For a mathematical treatment there did not happen to be any preferable choice of coordinates, so that the most convenient was always chosen for the solving of a problem. The same was true for motions of rotation. If on the hypothesis that the earth is fixed and its surroundings rotate about it, a velocity greater than that of light was calculated that also was no contradiction to the general theory of relativity, which did not demand a constant velocity of light as did the particular theory of relativity. With respect to the abolition of the ether Professor Mie stressed the fact that it had nothing to do with the theory of relativity. It had been abolished already in the eighties by the fundamental works of Lorentz. For the rest, Mie on the one hand admit-

ted himself an enthusiastic supporter of the theory of relativity, but on the other agreed with Mr. Lenard on a certain point, namely in his belief in a preferred system of coordinates and in the possibility of omitting assumed fields of gravitation. It did not seem to him as if their introduction had any theoretical scientific value, in the face of which he still preferred our healthy common sense. In how far, however, there was supposed to be a preferred system of coordinates in the world he was not able to inform Mr. Einstein.

Lenard expressed the opinion that the discussion had not been able to effect an agreement between the various opinions or a reciprocal conviction of their respective representatives because the contrast between the experimental and the mathematical physicist was shown here. This opinion was vigorously contested from another side by the objection that "the mathematical physicist was not in opposition to the experimental physicist, but only represented the discoveries of the former under a uniform point of view." (It is a question here of the 86th meeting of Natural Philosophers in Bad Nauheim from September 19th—25th, 1920. A detailed account of this discussion can be found in the "Physikalische Zeitschrift" X X I, 1920, page 666.)

An appropriately ironical evaluation of the objections of Messrs. Mie and Lenard was made at the time by a colleague who said: "One should permit them to finish, so that one can see that they have nothing to say."

In the last chapter the reader will see with what superficiality the congress of "Fiktions-Philosophen" at that time rejected the theory of relativity.

The extraordinary happened, however, in 1922 in Leipzig. (87th Meeting of Natural Philosophers, centennial meeting in Leipzig from the 17th—24th of September 1922.)

A group of physicians, mathematicians, and philos-

ophers having a strong anti-Semitic sentiment, was collecting signatures to a protest against the theory of relativity, which was described in this letter as a hypothesis without proof, which was full of contradictions, and was labelled a logical piece of fiction.

In Leipzig, at this congress, I met my friend B., who came from Zurich. I spoke to him very indignantly about the written protest. His face did not change and remained quite expressionless. "What's Hecuba to him, or he to Hecuba?" I thought.

A few minutes passed and then he said: "My pupil, X., (that is an erstwhile pupil of his, who also completed his doctor's dissertation under him), gave his signature too".

What should I have replied to this? Should I have given him a sermon and said that it was the duty of every scholar to educate his pupils to a certain awe for great scientific discoveries? His indifferent expression told me that such a sermon would have been quite beside the point, so I just remarked about that pupil of his: "What a lousy fellow!"

That remark of mine was taken very much amiss.

Soon I realized that the violent protest against the theory of relativity, which became noticeable between 1920 and 1923, did not spring from anti-Semitism alone; neither could it be explained by material reasons. One has to do no more than reflect that the logical foundations of the theory of relativity do not cause any difficulties either for the physicist or for any other natural philosopher.

The fact that the Nobel prize which Einstein received in the year 1922 was given to him not for the theory of relativity but for his law of photo-chemical equivalents, only proved that the Nobel prize directorship, as had already happened before, was not up to a proper standard.

I explain this protest on the basis of the petty self-love of the contemporary scientists. They felt themselves paling

as the great star, Einstein, appeared on the horizon. And, as it is often the case, rotten motives found their expression in rotten methods. The wounded egoism of the scientific functionaries sought a way out in anti-Semitism.

The nature of the Nobel prize itself was also a bone of contention for Einstein's petty adversaries. It is always the rule that the Nobel prize winner should give a lecture on the subject by reason of which the prize was awarded to him. Einstein, however, did not lecture on the law of photo-chemical equivalents, but on a subject from the field of the relativity theory. This fact now has offered an excuse to one of the co-authors of the book "A Hundred Authors against Einstein", (page 44), to give vent to his feelings against Einstein.

In 1922 I accidentally overheard from an adjoining room the director of one of the greatest scientific institutions telling his assistant that a little man, a Jew, had made a conquest of the whole world and was exalting himself above all his colleagues by some theoretical generalization, adding literally: "If such a case occurs again, we shall know how to prevent it in time."

I shall avoid being more explicit on the matter, however, so as not to hurt the feelings of our contemporaries.

I shall now come to the subject of how Einstein felt about and lived through all this which had broken over his head so unexpectedly.

The testimony which is given about this by the newspaper article referred to above has by no means exhausted the topic.

I shall now describe a conversation with Einstein; I was so affected by this conversation, however, that I quite forgot at the time to write down its date. I am thus forced to try to remember this date at random.

Probably it concerned the visit which I made to Ein-

stein about my observation of the legitimacy of the vertical column of the periodic system of the elements.

Having announced the date of my proposed visit to him, I received a post-card from him which is dated the 31.1. 1921. With regard to the contents I could see no difference from his former method of correspondence. But whoever is familiar with Einstein's handwriting will at once be able to discover a certain nervousness in the writing on this card. It reads as follows:

"31. I. 21.

Dear Colleague,

Many thanks for your friendly letter and for the visit you promise me. I am curious about your law. The booklet has already been translated into Russian by Dr. Itelson; I am therefore unfortunately no longer in the position to comply with your wishes in this respect.

With the best regards,

your A. Einstein."

The card was addressed to Leipzig where I was still living. Later I moved to Berlin where I was able to speak with Einstein frequently. The "booklet" to which Einstein refers is a generally intelligible presentation of the particular and the general theory of relativity; a Leipzig friend of mine had asked me to obtain the Russian rights of translation of this booklet for him.

I called on Einstein. He was visibly worried. Nevertheless, our conversation about the periodic system of the chemical elements turned out to be very stimulating and very interesting. On this point also, I received satisfaction; my work met with his approval, even his spirits showing a revival, after which the conversation turned to the outside world. Some time previously, Einstein had told me of the invitation to Switzerland which he had received and had asked me what I thought of it. At the time I had advised him against accepting the invitation. On no account, how-

ever, because of the incident with the rector of the Zurich university! My experiences in Switzerland had been much less harmless, and besides he was after all a member of the Prussian Academy of Sciences.

Now Einstein returned to the topic again. Suddenly his face changed. He began to speak of the anti-Semitic excesses against him, speaking in a very excited tone and expressing himself in such a manner of rejection about his entire surroundings, even against his scientific entourage, that I was rendered speechless.

I did not dare to interrupt him or to give my own opinion on the subject. His agitation communicated itself to me.

I soon took my leave and had not even enough energy to return to Leipzig by train, wandering aimlessly around Berlin for the rest of the day.

\* \* \*

It was only after a few days that I could give an account to myself of the fall which Einstein had experienced from the heights of scientific research, from the pinnacle of the discoverer-feeling into the cold prose of life.

The plunge of a research worker or an artist from the peak of life, or from any artistic experience into the depths of prosaic life, can be very great. I rack my brains in vain to find an example which will make this clear to the reader in a few words.

About thirty years ago, a boy in secondary school committed suicide after a concert by Kubelik, leaving only a few words behind him: "After this beautiful music I do not want to return to the prose of life." And in this case the student even underrated the prosaic quality of life. The fact of his suicide and his last words were utilized by Kubelik's impresario for Kubelik's further advertisement.

Einstein was unprepared when the excesses against him **crossed his path.**

Before the war, in Switzerland, Einstein took his rise, his success as a matter of course, as something which could not be imagined otherwise. He was fully and wholly charged with the feeling of his mission. He did not care a straw for the microbes! Now he had to realize that microbes, if they are only present in sufficient numbers, and this in organized ranks, may be hated, may be despised, but cannot be ignored.

Their abominable song can become very loud.

I can still remember a certain incident: I was walking in the Swiss Alps at the beginning of the war with a colleague, and was telling him how a deputation had come to Knut Hamsun, and had asked him for permission to erect his monument—a monument while he was still alive. Knut Hamsun turned the deputation away indignantly. "What do you mean", he said. "Now you want to put a monument up for me, and in former times I had to beg for some bones in the market for "my dog", which I then gnawed myself in some hiding place. In my book "Hunger", I myself am meant."

My friend could not see the meaning of this story. He thought that after all it was quite in order that the reward and appreciation of the world should only come after the achievement.

No, it was not a case of that.

That which Knut Hamsun went through changed his relations to the rest of the world.

The soul dies more than once. And is regenerated again.

Heine wrote:

Too late comes your answering love.  
They shower on my heart,  
Those warm love-looks of yours  
Like sunbeams on a grave.

Shakespeare would say: "How your soul has changed! If your face were to change like your soul, your own mother would not be able to recognize you!"

Formerly the splendor and harmony of nature which rules in the world of thought had lain in front of Einstein's searching eyes; and he was already inclined to find that everything was also beautiful in social life.

But when he was faced by the distorted picture of human society, he found himself a stranger there. He felt himself a prisoner and wrote:

"The individual feels the vanity of human hopes and aspirations and the grandeur and miraculous order which is displayed in nature and in the world of thought. He feels individual existence to be a sort of prison, and wants to experience the entirety of what exists as something uniform and significant." (I)

At the same time there was a change in Einstein's soul; if, before, it had still borne traces of Ghetto-nature, it now took on the character of world-weariness. His deep humility bears within itself the impress of the broken harmony of human society.

I) If I include this reference here in connection with the anti-Semitic excesses against Einstein, I have to remark that this was only written down by Einstein in 1930 in his article "Religion und Wissenschaft" ("Religion and Science\*"). The same sentiment, however, already finds its expression with Einstein in the year 1918 in his speech on the occasion of Max Planck's 60th birthday. In the following chapters all this is discussed *in detail*. This address to Planck, in my opinion, represents the most beautiful essay which has ever appeared in world literature about the emotional condition of the research worker. In Albert Einstein's book "Mein Weltbild" ("My picture of the world"), this essay is mistakenly attributed to the year 1923. Also the new title of the essay, "Prinzipien der Forschung" ("Principles of Research"), appears to me less appropriate than Einstein's old title, "Motive des Forschens" ("Motives of Research"), because it is not the question there of a principle or principles of research, but of the reason for the research. Compare: ("On the occasion of Max Planck's 60th birthday, speeches held on April 26th, 1918 in the German Physics Society," C. F. Mullersche Hofbuchhandlung m. b. H., Karlsruhe i. B. 1918).

We shall now go further into Einstein's sentence about the prison of individual existence.

, This sentence bears the closest relation to the spirit and core of Buddhism. The question, what is the spirit and core of the whole teaching of Buddhism, is answered by the Buddhist Catechism of Subhadra Bhikshu with the following words: "It is the impetus towards the breaking of the bonds of life, of the spiritual, moral, and physical bonds; the impulse towards freedom from suffering, death, and re-birth and the right directions for reaching this goal."

From the commentary of these words, which contains the corresponding part from the teachings of Buddha, I take the following comparison: "Whoever is filled with the life impulse, is like an animal in the snare. Therefore, may the Bhikshu overcome his joy in life, and strive only for passionlessness."

Interesting is the legend which attempts to explain how Buddha, then still Prince Sidhatta, conceived the thought of flight from the world. The Brahmans had told his father, the King Suddohana, that the spectacle of human suffering and of earthly transitoriness would awaken in the prince the desire to flee from the world.

Upon this the king ordered that everything which indicated suffering, misery, and death, should be kept away from the prince. The prince was surrounded with splendor and pleasures. Three palaces were built for him, one each for the hot, the cold, and the rainy season.

All the poor, the sick, and the old, were forbidden access to him.

And suddenly, while out riding, the prince, who was entirely unprepared for this, saw a frail bent old man, a sick man covered with sores, a rotting corpse, accompanied by a venerable mendicant friar. And the prince recognized the cold face of reality. The fact of his unpreparedness, the crash of his feelings was decisive.

Thus began the flight from the world of this greatest religious genius of all ages.

The growth of Buddhism in Asia after the war was caused by disappointment in European culture.

According to the judgment of the editor of the Buddhist Catechism, K. Seidenstiicker, there has also been in post-war Germany a greater need for the teachings of Buddha than before the war. And this is easy enough to understand, says Seidenstiicker: "In an epoch of decline, such as we are going through, in which the impermanence of earthly power and greatness, the uncertainty of ambitious plans and hopes, and the futility of existence with all its thousand vanities offers itself naked and bare to the eyes of humanity, the souls of many of our contemporaries are attuned more than usually, to the basic note of the Buddhistic conception."

But now, that we come to speak of the first half of Einstein's sentence, we can discern a very great difference between the emotional life of Einstein on the one hand and that of a Buddhist believer on the other.

Who was the great skeptic, the demon of doubt who put the following question to Buddha: "Is the spirit and core of Buddhism not pessimistic?"

The answer was as follows: Buddha taught the truth. The futility of life, disillusionment, physical and mental pain, represent the pessimistic side of truth. On the other hand, vanquishment of evil through one's own strength, (for greater length see chapter VI, part 2 of this book) instills courage and confidence, and justifies an optimistic interpretation. In what way, we ask surprised: extreme asceticism, the flight from life, the negation of every joy in life are optimism?

This is perhaps the only tenet of Buddhism which brings no conviction. Certainly it leads to redemption, to spiritual resurrection. But for that one must have a religiously ascetic nature from the beginning.

The great ascetic and philosopher, Spinoza, is aware of this fact.

He describes the love of God, his amor dei intellectualis, the vanquishing of all passions, after which a feeling of calm and security is aroused in man and true content fills his spirit forever, bringing him to the following conclusion: "It is true that the path to true happiness which I indicate lies far from the great road, and the climbing of it seems difficult and steep. Yet nevertheless one is able to find this path and follow it."

First, in order to gain firmer ground, I want to mention that an analogous conception, (=the pessimistically ascetic conception of Christendom), is held by R. N. Coudenhove-Kalergi: The earthly life of man is only understood here as a preparation for the world to come. Before the joy and suffering of eternity, the earthly joy of living pales. Instead of the joy of the senses, asceticism becomes the ideal; instead of riches—poverty; instead of pride—humility; instead of joy—suffering.

Religion appears as an accuser against nature, against the passions, against the instincts. Coudenhove-Kalergi, of course, develops this conception of Christendom with a reservation; he believes that it is only the rest of the world which interprets life and the teaching of Christ in this sense. But this reservation of his need not concern us any further, since this interpretation on the part of the rest of the world determined the character of Christendom; the question of what it would be if it were otherwise—has no practical value for us.

Nevertheless I ask myself again and again: am I sufficiently objective, if I fix the label of pessimism on Buddhism and on Christendom? For a Christian believer and a Buddhist believer will after all always be able to reply: "The fact that Schopenhauer has deduced his pessimism from Buddhism, is not authoritative for us. The joy of

redemption is higher than the small earthly joys in life; we preach the purest optimism."

I finally believe then that I have found an objective criterion in favor of my belief in the fact that often, very often, a sorrow, a grief of personal nature, a tragedy, in short, anything that lowers the tide of life, smoothes the path to the cloister.

On the contrary, there has never been a case in which a joyful event (that is an occurrence which raises the tide of life) has set any one on the path of religious asceticism.

The fact that a personal tragedy can open the way to religion can now and then be true also for the great founders of religions.

I shall limit myself at this moment to a mention of the Japanese Buddhist Kamo no Chomei, in whose case this is entirely correct (See Kamo no Chomei, *Notations Made in a Small Hut, Translated from the Japanese and Explained* by the Japanologue Alexander Chanoch, *Ostasiatische Zeitschrift, Neue Folge, VI, Heft 3-4.*)

The fact that the great prophets, Buddha and Christ arrived at their doctrines without first undergoing a personal tragedy, represents no contradiction to my expressed opinion; it only means that the great prophets, Moses, Confucius, Socrates, and especially Buddha and Christ already carried a religious, ascetically pessimistic tendency within them. (The religious philosophy of George Simmel, discussed in the following chapter, lends my thoughts a high degree of probability.)

And how did Shakespeare, the greatest literary genius of all times, become a pessimist? Various opinions have been expressed on this subject. It cannot be denied however, that Shakespeare became quite another man in the year 1601. Just a short time before he had been writing comedies, one after the other, in which only a careless mirth is transmitted, but after this he wrote his "Julius Caesar", where

the mirth is replaced by despair, hopelessness, and a tragic fate, and then "Hamlet" where (in the apt words of a critic) it is only Hamlet himself who laughs, but this in a way which leaves us in the dark whether he is shuddering on account of this mirth or because of his mad sighs. (Compare: Schestoff "Shakespeare's Julius Caesar".)

Some people maintain that Shakespeare was depressed by the trial and conviction of his high friends; others speak of Shakespeare's unhappy love; the third group mentions the death of his father.

Whatever it might have been, it is evident that something happened in Shakespeare's life. But another thing is also evident: the more deeply Shakespeare became absorbed in his tragedies, the more he found not only his old calmness of soul but also satisfaction, the exalted feeling of the creator and true happiness.

The question as to the difference between Einstein's emotional life and the basic concept of a Buddhist now receives the clear and simple answer: Einstein stresses his reference to the "grandeur and miraculous order which is displayed in nature and in the world of thought".

This outweighs "the futility of human hopes and aspirations" convincingly, very convincingly, lends grandeur to and increases the joy of life; it regenerates the ailing soul, and raises self-confidence. Redemption without asceticism, a higher joy in life, true optimism, is only to be attained with the help of the highest spiritual effort, with the aid of art and science. The religious natures of modern times have found the key to heaven.

\* \* \*

The creative genius, the interpreter of the harmony in the world of thought or the world of emotion (meaning an artist), or of the harmony of nature, regenerates himself by the creative process; the latter brings him the joy in life with which he confronts his suffering, the pain of his soul.

To be able to define the true nature of this spiritual regeneration, we must now answer the question as to what this regeneration does not represent.

Socrates said to Krito: "Those who hold the power in this state can do me neither good nor harm; for they cannot make one reasonable or unreasonable; they only do what happens to fit in. "These words are usually interpreted that the potentiaries can do no harm for the reason that the spirit is invulnerable, unconquerable. Here is the beginning of the philosophical stoicism which the philosopher (but only when he is almost a saint) sets opposite to all the obstacles in life.

The Buddhist attains this condition of philosophical stoicism by approaching the condition of Bodhisattva. The Bodhisattva ideal consists in the fact that the Buddhist feels an impulse to stretch out a helping hand of redemption to his suffering brothers, before he attains it himself. The Bodhisattva remains in the world out of pity for this world; but he is already out of the reach of the world's evil. (See "Die Religionen des Orients", 'The Religions of the Orient' 2. Aufl., Verlag Teubner, Leipzig-Berlin 1913; pages 83 and 231.) In the interpretation of Buddhism, therefore, Socrates is a Bohdisattva.

Quite in contrast to this, the creative genius, in particular the intellectual genius, is neither a hero nor a saint.

He does not overcome the evil, he pushes it aside by the creative abundance by which he is possessed. Heine continued the writing of his works on his death-bed, a short time before his death.

The great mathematician, Minkowski, said before his death that it was a pity that he had to die in the era of the development of the theory of relativity.

The abundance, the spiritual frenzy drives out pain, offers a regeneration from old sorrow. The basis of our conscious existence is memory, the stretching of the past into

the present (See: "Die unumkehrbare Dauer und das Altern", 'The Unreversible Duration and Growing Old', by Henri Bergson: "Schflpferische Entwicklung", 'Creative Development'). The creative abundance pushes aside the old sorrow; extinguishes the past sorrow; rejuvenates the ailing soul.

While the saintly ascetic withdraws himself farther and farther from life, the creative abundance brings the creator back to life with all its passions.

Even today Einstein is very fresh and youthful. Externally, of course, he looks more than his age. But only a short time ago, I was surprised how youthfully affected he was when I told him a tragic incident. How young Einstein was then! It occurred to me later how fantastic and unlife-like is Leonid Andrejew's description of the astronomer in his play: "Zu den Sternen" ("To the Stars").

When Andrejew's astronomer is told of the death of his friend, he remains untouched and replies coldly: "Every second a man dies on this earth, and every second a solar system is destroyed in universal space."

I am of the opinion that it is not Einstein's travels, undertaken at the invitation of innumerable universities and academies to give them lectures, and not his outward success, but his continual, unending scientific activity, his intellectual abundance, which is responsible for this youth. At the same time I want to point out the following circumstance: from the chapter following below, the reader might gain the wrong impression that outside of physic, Einstein gives preference in his emotions and efforts to the Zionistic movement.

This conclusion would be wrong. Although Einstein gave much attention to the Zionistic movement at a certain period, it may nevertheless be seen, (see, for instance, his letter to Romain Rolland, cited below) that it is the interest

of entire humanity which principally engage his attention and emotion. But I shall now continue chronologically.

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Einstein's Zionistic activity begins in the year 1920. His conception of Zionism, however, as we shall see in the next chapter, does not conform in all its particulars with the program of the Zionistic party and essentially bears a purely defensive character. In the same way, Einstein's socialism is by no means congruent with the one-sided focus of the social democrat or of the communist parties.

I was even able to conclude from a letter of the central organization of the German social-democrat party, the "Vorwarts" in which Einstein is mentioned, that serious difficulties had arisen between Einstein and the social-democrat party. He also is a bitter opponent of any form of dictatorship.

There were bonds of a close friendship between Einstein and the great champion of culture, Walter Rathenau. When Rathenau was murdered in 1922, Einstein's sorrow was unbounded.

As the reader will have been able to conclude by this time, however, Einstein is a passionate adherent of pacifism, of the peace movement in all its developments.

It caused him great pain that the war-mood had taken hold not only of the circles closely connected with the governments, the blood-aristocracy, but had also claimed the spiritual aristocracy. Einstein suspected a treason towards the spirit here.

While I was paying a visit to Einstein's home one time (in the year 1921 or 1922), a messenger arrived from a Berlin hotel with the message that Anatole France had arrived in Berlin, and wanted to know when he could call on Einstein.

The prestige of Anatole France during the war was so great in France that no measures were taken against him on

the part of the government in spite of his pacifistic agitation. When the Turks had been severely beaten during a certain battle and had lost all their ammunition, Anatole France ironically gave the French Minister of War the following advice: "You had better send the Turks as much ammunition as possible now, so that our army will be given the opportunity to celebrate great victories."

During the war Romain Rolland addressed the request to the intellectuals of all countries, to remain "au dessus de la metee".

Quite lately, Bernard Shaw has confessed why he did not follow this exhortation of Romain Rolland. One cannot—writes Shaw—remain neutral in a battle between two pirate fleets, if one happens to be on board of one of them.

Romain Rolland thought otherwise, and if his call did not show any practical results, it at least affected many hearts.

We would not have time here to go into this any further. I shall limit myself to the greeting which Einstein sent to Romain Rolland on the occasion of his 60th birthday. "Revered Master,

"Only once have I seen you with my bodily eyes, when you were still under the fresh impression of the out-break of the European catastrophe, a lonely man, a seer, suffering unutterably with humanity, bowed down by the knowledge that you were unable to create light and bring redemption. You have never been able to find full solace in acting on the finely organized by your art and your word; you want to help the human creature which languishes in self-created misery.

"The common masses do their work out of the stuffy passions to which they and the states which represent them, are entirely subject. They rave against one another in their delusion, and drive each other into disaster; but, on the whole, they accomplish their horrors without any inner

dissension. The few, however, who do not take part in the **raw** emotions of the masses, but cling to the ideal of the love of humanity uninfluenced by passion, bear a far heavier fate. They are ejected from their community and are treated like lepers, if they do not accomplish deeds against which their conscience revolts, and do not, like cowards, hide what they see and feel. You, revered master, have not kept silent, but have suffered, fought, and consoled like a great soul.

"In this time, so mortifying for us Europeans, it has become evident that athletics of the spirit do not protect one against pettiness of soul and a barbaric way of feeling. I think that noble human sentiment does not thrive any better in the universities and academies than in the work-rooms of the unknown dumb man of the people.

"Today you are saluted by the community of those who see in you a shining ideal. It is the community of lonely ones who are immune to the epidemic of hate, who see in the abolition of war the first goal of the moral reconvalescence of humanity, which seems to them incomparably more important than an isolated interest in one's own nation or one's own state!"

In this greeting the summons to an organization of the intellectuals can be felt.

Jules Romains has justly raised the question: "Do the intellectuals of Europe well understand the fact that another failure would cause the role of the intellect in worldly matters to play out finally?"

The word "intellectuals" sounded like a thousand-fold battle-cry—says Jules Romains—at the time of the Dreyfus affair; at that time the intellectuals for the first time planned an organization of their ranks, went into battle, and were victorious. Now, in the Great War, they have missed fire. Meanwhile for the last century, humanity has more and more urgently demanded the help of the intellectuals.

The masses have been shaken more and more severely in monarchistic and religious authority, and now seek shelter with the intellectual authorities.

Jules Romains asks: can one not say with perfect justification that of the millions of humans who fell in the Great War, a good number were killed by the phrases of poets and public speakers, and by the demands of the philosophers?

To this treachery on the part of the intellectuals, who put their eloquence and their knowledge at the service of religious and national fanaticism, an end must now be made.

Jules Romains now demands that the intellectuals of Europe should chiefly consider the demands of the intellect in deciding the nature and direction of their action. If the intellect does not want its own destruction, it must admit that it needs freedom and peace. This is not idealism, but the *conditio sine qua non* of its existence and its thriving.

Jules Romains, however, does not believe in an organization without a working program. For this reason he first summons the intellectuals of Europe to a mutual task. An encyclopedia is to be compiled—a work of audacity, of progress and of battle: "What great essays and great names could be joined there: Einstein, Thomas Mann, Gorki, Hamsun, Freud, Unamuno, Ferrari, Rolland, Bernard Shaw, and fifty others."

A free intellectual power is to be founded, which is far removed from academic vanities.

Einstein teaches: "Every thinking, benevolent, and conscientious human being, should, in peace time, take upon himself the solemn and irrevocable obligation, under no consideration whatever, to take part in any war-like action or its direct or indirect support."

During a discussion I was once asked to which political tendency Einstein belonged, or to the opinions of which social politicians Einstein was the nearest. I was able to point to Herbert George Wells. The social opinions and

aspirations of this distinguished author are summarized in his book: "The Open Conspiracy. Proposals for a World-Rebellion." The German translation of this book was published in 1928, by Zsolnay.

In his chapter: "Existing and developing movements whose union with the open conspiracy may be expected", Wells points out the concepts which pacifism has to follow if it is to assume a concrete character.

The task of humanity is, according to Wells, the world-state: "The basic organization of our contemporary governments is still a purely military one, and that is just the thing which makes a world organization impossible. Flags, uniforms, national anthems, patriotism, which is industriously nurtured in churches and schools, the cheap, boasting tumult, which, with us, accompanies the race for superior power—this all belongs to a phase of development which we would very much like to ascribe to the past."

And further: "This open attack for the domination of the world must be undertaken for the sake of science and creative accomplishment."

Just like Einstein, Wells speaks of the organization of a movement for the refusal of any kind of war service.

Wells sees the weak points of communism, and decidedly rejects the oligarchy of Russian Bolshevism, but just like Einstein, he also speaks of Russian politicians who do their best and also often make successful attempts towards the socialization of economic life. Another passage in Wells reads as follows: "Open conspiracy is the natural inheritor of socialistic and communistic enthusiasm and it stands to reason that it will enter Moscow long before it has taken possession of New York."

It is interesting that in Wells' books the religion-like character of this enthusiasm is expressed in so far as it speaks of the necessity of a re-birth, and the practical working out of modern religion.

The thoughts on religion, which, as we shall see in the next chapter, Goethe, Simmel, Einstein, and others have developed, are thus brought to full significance in Wells.

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Einstein was elected as the German representative in the newly formed Committee for Intellectual Codperation in the League of Nations. The first meeting of this committee took place in Geneva with Henri Bergson as chairman. Einstein remained a member of this committee up to the moment when the troops of the Entente powers took possession of the Ruhr-territory. His resignation from the committee was, as it were, a protest against the occupation of the Ruhr. Some time afterwards when Germany and France had come to an understanding, Einstein again became a member of the League of Nations committee; he remained there up to the time of his cardiac affliction in 1928.

The most interesting events on the horizon of the scientific world, however, were Einstein's travels. Since the beginning of time, no scholar has received so many invitations from the most diverse universities as has Einstein.

These travels raised Einstein's fame to a regal height, mended the thread of contact between the representatives of science, which had been broken during the war, and once more offered to the mass of the educated certain mental interests, which had sunk to a frightfully low level during the War.

His first lectures in Paris, in 1921, aroused a certain mistrust among the reactionary German groups. In France there were also people at that time who did not know what position they should take regarding them. Einstein's objectivity, however, and the intellectual height of his lectures and scientific discoveries, overcame all the ill feeling.

The trip which he took to America soon afterwards, represented the awakening of the intellectual interests in the

post-war period; at the same time there was a rise in Germany's prestige in other countries.

At that time a rector of a German university remarked with some justification in his election-speech, (Rektoratsrede): "Our only active account abroad now, is our science." And this account grew.

The international character of Einstein's travels was openly acknowledged in the cordiality with which Einstein was welcomed by Harding, the President of the United States. New York celebrated Einstein's visit more enthusiastically than it celebrated the visit of a ruling monarch.

Einstein's connection with the city of Princeton dates from the year 1921. In a ceremonious meeting he was awarded the honorary doctorate by the Princeton University in the presence of a great number of scholars from many other American universities. Professor Hibben, the President of Princeton University, welcomed Einstein in German, and praised him as the "new Pythagoras, who has inscribed his name on the tablets of science in the ranks of Maxwell, Newton, and Galilei, which begin with Pythagoras". This was followed by the graduation ceremony held in Latin. Today Einstein is active in the Flexner Institute at Princeton.

Einstein's trip to London, where his lectures were introduced by a welcome on the part of Lord Haldane, made a great impression on the civilized world.

After this, Einstein made a very extensive trip, namely to Japan, in 1922. The pomp of his reception in Japan surpassed everything which had been offered to Einstein up to this time.

He also gave lectures in Spain, Palestine, and other countries.

It is due to him that the opening of the University of Palestine took place with such impressiveness.

The honors and honorary diplomas v/hich were present-

ted to Einstein, surpassed any honor a mortal has ever received during his lifetime.

By and by his interest in social questions also increased.

In conversations with Stresemann, with Briand, and later also with MacDonald and other politicians, he speaks for a policy of mutual understanding, a policy of peace.

His fame and the enthusiasm of his friends reached their peak on Einstein's fiftieth birthday on March 14th, 1929.

From all quarters of the globe, mails and telegraph brought congratulations, which the postal service sent to his house in bundles. Many newspapers published lengthy articles which were dedicated to him.

Emil Ludwig wrote an interesting article about Einstein in the "Berliner Tagblatt" (No. 124 of March 14th) in which he stresses Einstein's tolerance and kindness of heart, and mentions the readiness with which Einstein defends his opponents. Emil Ludwig speaks of Einstein's gay letters in which he consoles poor sufferers or welcomes great intellects. Thus, for instance, the best thing which Shaw heard about his "Joan" was, in his own words, contained in a letter from Einstein. It is interesting what Emil Ludwig tells about the happiness which Einstein feels before great works of art and about Einstein's words: "The most beautiful thing which there is in this world, is a beaming face."

Of other newspaper articles dedicated to Einstein, I may mention a memorable essay by Dr. Poduch in the Berlin newspaper "8-Uhr Abendblatt."

Another newspaper said: "He deserves great mention in connection with the rehabilitation of the relations within the international world of scholars after the war, and he speaks a weighty word where it is a question of preventing injustice to individuals and communities and of defending individual and collective human rights."

I can remember the following: After Einstein's first trip

to America, Einstein's wife was telling me how ceremoniously Einstein was received and honored in America; But a certain melancholy in her recitation did not escape my notice.

When I tried to discover the reason of this melancholy, Mrs. Einstein finally remarked: "It seems to me after all, that if a great prize-fighter had been received in New York, the ceremony would have been no smaller."

Now, on his fiftieth birthday, all doubts were stilled; the world honored the intellectual and moral genius I

The state of Prussia acquired the bust of Einstein created by the sculptor K. H. Isenstein, which was unveiled in the Einstein-tower near Potsdam on the occasion of his fiftieth birthday. The Provinzial-Museum in Hannover also acquired one of these busts.

On April 16th, 1929, an Einstein-celebration was held in the New York Metropolitan Opera-House. A great impression was made by telegrams of welcome from the President of the United States, Herbert Hoover, and from Balfour; the rectors of several American universities also sent words of greeting.

I likewise sent a greeting to my great friend and teacher, which was also signed by the three men who were working with me at the time. Einstein's answer was in the form of a poem! Here it is:

Every one to me today  
 Has shown himself in the very best way  
 From far and near my every friend,  
 Has touchingly written to me, no end  
 And me with everything presented  
 Which could make my heart contented,  
 Such as an aged man like me  
 Could still have need of possibly.  
 They all approach with songs to wit  
 To add to my feast a pleasant bit

Even the Schnorrers, numberless withal,  
 Dedicate their Madrigal.  
 Therefore raised to the skies I feel,  
 Like the eagle who does in the heavens wheel.  
 Now that the day approaches its end,  
 I make to you my compliment,  
 All you have done is well indeed,  
 And the sun, he smiles God-speed.

A. Einstein,  
 peccavit 14. 111.-29.

To you and your three right hands, cordial thanks.

Your A. Einstein.

The poem had been transferred to a card by a lithographic process.

The words under the poem were written in ink, but are hard to distinguish from the lithographed part.

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In order to form a conception of the popularity which Einstein had already achieved ten years ago (that is in the year 1922), it suffices to mention the fact that in the short period between 1916 and 1922, fourteen editions of his booklet "On the particular and general theory of relativity", were printed in Germany alone! Einstein had, indeed, described this booklet as "generally intelligible\*\*", but reality it operates with the Gauss system of four-dimensional coordinates and the geometry of Riemann. It is Einstein's lively form of expression and the attraction exercised by him as the founder of the theory of relativity, which made the booklet so popular. As many as 10,000 copies were already printed at the time of the 10th impression in 1920, which is extraordinary for a scientific book (not a textbook). Hans Thirring's book: "Die Idee der Relativitätstheorie" is considered superior in pedagogy and intelligibility; only two editions of the book have appeared up to now.

To avoid misunderstanding, I will not omit to mention

the fact that belletristic books often attain 40 editions or more in Germany. Books dealing with the world war especially attained a high popularity. Also in former times, Dumas pere felt himself so popular that in the year 1848 he wanted to become a member of parliament with an electoral manifest in which he mentioned the fact that he had written 400 books and 33 plays; every play was performed a hundred times; in France alone, his writings had procured work for 2160 people. The one who protested against this was his own colleague, Paul de Kock; he had written 63 novels, from which he had made a sum total of 63 million francs. His own popularity was so great—wrote Paul de Kock,—that fifty Thaler's worth of Paul de Kock autographs were being sold daily in the Hotel Bullion and that he had written at least 6000 autographs.

The reader will understand why I have cited the case of these two French writers; generally only books of the belletristic type are widely read; in Einstein's case, a book which was not easy to read became popular; this book had the mission of presenting his scientific work in a readily intelligible fashion, (without the help of difficult fields of mathematics) and, as we shall see further on effected a change in the interpretation of the world. The number of books which have since been written by various research workers on the subject of the theory of relativity has reached a very high figure.

I shall not omit mentioning here that the conclusions of the theory of relativity are so philosophically general and their logic so instructive, that their method is often imitated in other fields, and I have used them myself in analogy, in my theory of displacement.

An interesting article was published by Einstein in the "Berliner Tagblatt" of December 25th, 1929. The article has the title: "To a young scholar",

Einstein tries to dispense the doubts of a young man

wanting to devote himself to the study of mathematics in the present difficult economic situation.

First, he gives the advice that the young man should not let himself be misled by over-anxious reflections for "only he who remains true to himself becomes a real personality, and only as such can one really be something to others".

The possible question of the young man whether the study of mathematics or physics would enable him to earn his living, for instance by teaching or research, Einstein answers as follows: "It is not at all necessary that you become a teacher or a research worker". In spite of this fact, Einstein adheres to his advice that he should devote himself to the study mathematics and gives two reasons for his optimistic point of view: firstly, that he himself had studied mathematics and physics in Switzerland without finding employment as a teacher later on, but that he had at that time found a position as preliminary examiner in the patent office; he had possessed no technical knowledge then, but "it soon became evident that a general comprehension of physical relations was often more valuable than expertness and routine. That which is acquired through pure joy of learning is a generally useful instrument in the hands of a wide-awake person."

Einstein's second reason consists of the fact that it is after all questionable on the whole, whether a research worker by profession is in a more favorable position with respect to research work than one who earns his living as a "tinker". And Einstein concludes: "Perhaps science belongs to the frail women who feel more happy as a beloved one than as a housewife."

Here, as well as in other cases, the beauty as well as the polish of the language used is noticeable; whether it happens to be in a scientific essay, in a piece of literary writing, or in a congratulatory letter, the beauty and eloquence of Einstein's language are always surprising.

Einstein wrote to Bernard Shaw on the occasion of his birthday:

"... It is given only to a very few to fascinate our generation by humor and grace and to hold a mirror before it by the impersonal means of art. I send my greetings with the heartiest congratulations today to the greatest master of his kind, who has made us all happy and has educated us."

Einstein's letter of congratulation to Max Leiebertmann contains the following characterization:

"... Clean, upright, proud, and given to no compromises, at the same time displaying no pathos, not setting himself on a pedestal demanding adulation, but always a human being who, so to speak, uses the familiar form of address to everything animate and inanimate ..."

\* \* \*

At the beginning of 1930, I had several discussions with Einstein on the subject of my book "Grenzflächenvorgänge in der belebten und unbelebten Natur", to which Einstein wrote the preface. The discussions took place in Einstein's study which was situated in the tower-like erection on the house in which he lived near the "Bayrische Platz" in Berlin. Besides his assistants, his intimate co-workers and friends had access to the work-rooms in this small tower.

Once I met the empirical philosopher, Hans Reichenbach there.

Einstein had already completely recovered from his severe heart ailment. With a youthful passion and the noticeable absence of diplomatic expression, he voiced his disapproval of a certain colleague to me on one occasion. During one of these discussions, a sculptor was working on Einstein's relief picture.

In the beginning of December 1930, Einstein accepted an invitation from the California Institute of Technology,

which is situated in the vicinity of the largest observatory in the world, the Mount Wilson Observatory.

Einstein's friend, the Nobel-prize winner, Professor Milikan, is working at this university. The purpose of this trip was the discussion of the theory of relativity, both by private sessions with the physicists of the university and by a physics "Colloquium" in the university. The trip was to bear an entirely private character; according to the urgent wishes of Einstein, all official receptions were to be omitted this time. For this reason, the university at Pasadena had refused to give any kind of information about Einstein's trip. The Wilson observatory only remarked, that Einstein was the possessor of a permanent invitation and did not have to announce his coming beforehand. Nevertheless—as is announced in a New York telegram of November 21 st, 1930 (See "Berliner Zeitung am Mittag", Berlin, November 21st, 1930)—Einstein's impending trip to America caused a great sensation there. The American advertising-agencies wanted to use Einstein for their propaganda. One firm offered him fifty thousand dollars for a few words commending a laxative; another firm offered him a hundred thousand for a cigaret advertisement. Naturally, Einstein refused all such offers.

The above-mentioned news-telegram was now followed by an article by the well-known journalist, C. Z. Kldtzel, entitled: "The mysterious trip". According to my knowledge, this is the most humorous and most witty essay which has ever appeared about Einstein in a daily paper.

If in former years Kldtzel's travel reports had already shown that his pen possesses both talent and verve, now, after following up the articles about Einstein in the sundry daily papers for several years, I retained no doubt that Kldtzel was a most unusual journalist.

Kldtzel begins by stressing the fact that what he was writing, represented no interview with Einstein; that, in

fact, there was no interview over his planned trip to America; this was supposed to remain a secret. But that in Einstein's vicinity "there were murmuring sources from which one could draw".

From these sources, Klotzel reported that this time there was no immediate reason for Einstein's trip, not even a scientific one; Einstein was not scheduled to hold any lectures in America, not even in Pasadena; there would be no sensations except—intimates Klotzel—that a clever photographer might have the opportunity of catching on one and the same photographic plate, the pictures of six people who understood the theory of relativity; but perhaps there would only be five of them—or three.

But even if there should be only one, that would not prevent the Americans from offering their homage to Einstein.

Already on his table was a heap of telegrams from America inviting him to live some place, to speak somewhere, to lay foundation stones, to inaugurate buildings, to take part in processions, and to partake of banquets. Klotzel alleged to have held in his hands the telegram of an American churchman who had spent a great amount of money to find out as quickly as possible, whether Einstein was, or was not, a determinist. (The reader will be informed on this question below.)

The trip was supposed to remain a secret. Einstein was supposed to remain incognito, but in America they were, out of joy, unable to keep the secret, so that the enthusiasm of the Americans raged in leaping flames and demanded its victim. Einstein knows—Klotzel says jestingly—what it means. Einstein had not forgotten how on his first visit to America, the New York police had to save him from the charge of the newspaper reporters and flappers.

Klotzel's joke about the press photographer who waited days for Einstein on the steps of a new church in **New**

York, is an allusion to the fact that a New York church actually had Einstein chiseled in stone as a Saint.

These few lines are, of course, not able to reproduce the beauty of Klotzel's essay; I have taken the above out of Klotzel's essay solely for the purposes of biography.

I, for my part, felt Einstein's trip to America very painfully.

It seemed to me, that this time Einstein would not return from America.

My imagination was already deluding me with the belief that an estrangement had grown up previous to his departure, between Einstein and his Berlin friends and also between Einstein and myself.

I felt a certain emptiness invading the intellectual life of Berlin.

Days went by. The papers were already bringing long articles about the welcome which had been offered to Einstein in one or the other American city; aphorisms were already being sent over in the shape of his answers to the welcomes offered him, and also in the form of interviews which he had granted.

I remembered: Once during the period of inflation when Einstein and his two sons came to visit me in the small flat which I then had in Charlottenburg, my friend, J. Brodski, who was present at this tea, said that he did not believe that Einstein was so closely linked with Berlin in his intellectual activities as was generally believed; that while one was speaking to him, one could already feel that he was somewhere else.

His absence was brought home to me with especial painfulness when I encountered a difficult problem of physics in the course of my work.

For the first time I was forced to seek the help of some other adviser in the place of Einstein. I went to Professor X.

What a disappointment awaited me! His whole manner already appeared strange to me. How he tried to exalt himself with every sentence! How small and petty were his "thoughts" I Every inch—a boor. A boor with a mathematical brain. Probably Schopenhauer had made the acquaintance of such a scientist when he wrote together with Lichtenberg: "The so-called mathematicians by profession have, by relying on the immaturity of the rest of humanity, gained the reputation of depth which has a great similarity to the saintliness which the theologians have gained for themselves (or more correctly, claimed for themselves)."

(Incidentally I want to mention that the reader will make the acquaintance of Einstein's position with regard to mathematics, in the last chapter.)

My fears were not confirmed. In 1931 Einstein returned from America, and in the summer of 1931 he already accepted an invitation from England to lecture in Oxford, Einstein went to Oxford. Again the newspapers published lengthy articles about Einstein and about the presentation of the honorary doctorate to Einstein at Oxford. The "Neue Freie Presse" commented on the long Latin speech of welcome held by the Oxford prorector Dr. Homes Dudden, which was understood by none of the continental guests, not even by Einstein himself, since it was spoken with an English accent so that not much remained of the original Latin.

In the "Sunday Express" a long interview with Einstein was simulated. A detailed account will be given below in "Einstein und Nationalismus" ("Einstein and Nationalism").

This trip of Einstein's also came to an end. In September 1931, Einstein held some interesting lectures in Berlin and spent some time sailing in his boat in Caputh near Potsdam, where his beautiful estate is situated.

At this time Einstein had a great many visitors in Caputh; his co-workers and adepts came to him not only

because of scientific problems, but also to discuss questions of social and general philosophical import with him. Often he was stimulated by this and induced to turn over in his mind problems which were far removed from his own special branch of science. Now and then I could perceive in a lecture held afterwards, that he treated a formerly discussed subject with more detail. From this standpoint his Berlin lecture in the Schoneberger town-hall on October 21st, 1931, is of especial interest. This lecture had the title, "Results of modern natural science and its influence on the conception of the world".

Einstein distinguishes a direct and an indirect influence of natural science upon the conception of the world. The direct one: technical science has liberated the slaves from a condition which is now hardly imaginable, has turned beasts of burden without a feeling of identity, almost without any consciousness of existence, into human beings. If today we suffer from the negative results of technical science, from unemployment and from all the cares connected with it, this is—says Einstein—not the fault of the technical development, but the fault of our lack of economic and social organization; this development was not the cause of our misery but man himself, who had been found wanting. It is technical science itself, hopes Einstein, which will force us to work out a finer organization.

With regard to the direct influence of natural science—more exactly the knowledge of physics—on the conception of the world, he is interested in the first place in the problem of causality, the problem of determinism.

Determinism consists of the interpretation that the present condition of the world determines the future one in quite a definite manner. The educated man of today, who obtains his knowledge of natural science chiefly from the scientific armory of yesterday, tends to believe in determinism also with respect to spiritually-moral matters.

Anyone who believes in predestination through the glands for instance, will take up a different standpoint with respect to criminals from that of one who is not a determinist. The more this view, the belief in glands—is spread, the more the belief in punishment will decrease. Punishment—in Einstein's opinion—is nothing else than refined revenge.

And now Einstein goes on to the problem of determinism in natural science itself. Newton's picture of the world which is characterized by specks of mass in a previously formed space has really dominated the thought-process of the physicist up to the present time, but is subject to two modifications. The first was led up to by the field-theory, originating from Faraday and Maxwell and developed by the theory of relativity; this interprets the specks of mass as nothing more than a special concentration of the field. This interpretation which seeks a uniform explanation of the essence of matter as a "field", in the sense of the electric or magnetic fields, has not been finally accomplished as yet; but Einstein believes in the possibility of such an achievement.

Quite in accordance with Newton's picture of the world, an attempt is being made to describe reality in a completely deterministic manner. A complete contrast to such a deterministic description is offered, however, by the tendency chiefly represented by Schrodinger and Eisenberg, according to which causality is not a statement which is made concrete by experience. And this, in the first place, because of the fact that the very observation of a physical condition changes this condition; at least in the case when the examining instrument "condition" which the physicist Born once described as the "probe" and the condition which undergoes examination belong to series of values which are very small and which can hardly be distinguished from one another. This interpretation of the uselessness of deterministic theories Einstein does not share emotionally, and

he inclines to the opinion that in the long run, determinism is more suitable in physics, hoping that he will be able to prove his standpoint by theoretical means as well. At the present, causality in the larger sense suffices for him in everyday life and life outside physics; it would be a mistake to deny it on the ground of molecular observations. The philosophers do not have to tremble for their category of causality, and the world-conceptive views produced by determinism, even if they belong to yesterday, are still valid, in spite of atomic physics.

On the first of December 1931, Einstein again left for Pasadena with his wife. The couple returned to Berlin in the spring of 1932.

In America also, Einstein appeared before the public now and then to lecture on general topics, especially on such subjects as were dedicated to his favorite theme, pacifism. How indignant he was over the military action of the Japanese against China! How angry he was that the great powers remained passive towards it! In a pertaining lecture he remarked:

"Imagine, for instance, that the American, British, German and French governments would demand from the Japanese an immediate cessation of the military attack in China under the threat of a complete boycott of Japanese goods. Do you think that any government could be found in Japan which would take upon itself to drag its country into dangerous an adventure? Why is this not done? Why does every individual and every nation have to tremble for its existence? Because every one of them professes to seek its own miserable momentary advantage, and does not want to subordinate it to the welfare and prosperity of the community at large."

The politically unsettled period which Germany went through in 1932 also made certain demands on Einstein. More and more he was brought into contact with public life

and in the summer of 1932 he was active in a leading capacity in the attempt—incidentally so unsuccessful—to reconcile the communists with the social democrats in order to present a uniform front to the fast growing tide of National Socialism.

In the autumn of 1932, the "Deutsche Liga für Menschenrechte" ("German League for the rights of humanity") persuaded Einstein to fix his "creed" on a phonograph record. The record as well as its exact text have been lost, and I must content myself with trying to reproduce it from a newspaper article. I shall choose the notice which appeared in the Berlin newspaper "Tempo" of January 24th, 1933. Einstein starts with the assertion that he knows exactly how far his life has been built up on the work of others, and what thanks he owes them. He denies the freedom of the will. This reconciles him to the actions of man, even if they are very painful to him. The realization of the non-existing freedom of the will protects him from taking himself and other humans all too seriously and losing his sense of humor.

"I have never aspired to riches and luxury", he says, "and even have a good deal of contempt for them. My passion for social justice has often brought me into conflict with others, as well as my dislike of any kind of bonds and dependence which did not seem absolutely necessary to me. I have always respected the individual and have an insurmountable aversion for violence and "clubism" (Vereinsmeierei). Out of all these motives I am a passionate pacifist and anti-militarist and reject any form of National Socialism, even if it expresses itself only as patriotism."

Then further: "Privileges arising from position and possession have always seemed unjust and fatal to me. Just so, an exaggerated cult of the personal. I admit the ideal of democracy, in spite of the fact that I am well acquainted with the drawbacks associated with the democratic forms of government. . . Social equalization and economic **pro-**

tection of the individual have always seemed to me important aims of a public community."

Einstein, in his private life, admits himself to be a typical "lone wolf". But the consciousness of belonging to the invisible community of those who strive towards truth, beauty, and justice, had not let a feeling of isolation grow up. The most beautiful and most profound thing which a human being can experience is the sensation of the mysterious. "It is a basic part of religion, as well as of all deeper aspiration in art and science . . .

"Who has not experienced it, seems to me, if not a dead man, at least a blind one."

The last public lecture which Einstein held in Berlin was on October 16th, 1932. He spoke on the problem of universal space, for the benefit of the scholarship fund of Jewish Students Associations in the Berlin Beethoven Hall. (I am limiting myself to this short mention here, as the reader will be given more detailed information in the last chapter.)

In the first half of December 1932, Einstein left Berlin for good and with Mrs. Elsa Einstein embarked for America at Bremerhaven on the steamer "Oakland", never to return to Germany again.

## CHAPTER IV.

# Einstein's Police Registration Form.

We read in a letter of Einstein's written in the year 1920:

"I am neither a German citizen, nor is there anything in me that could be qualified as 'Jewish faith'."

When I read these lines, my first thought was that what they contained was expressed much too briefly, and that I would have to talk it over with Einstein personally.

I shall, however, first put down some preliminary remarks.

The first question is: what position did the classicist of philosophy, Emmanuel Kant, with his deep religious feeling, take up in regard to his paternal faith?

I shall quote here only a popular, generally intelligible description of Kant's life and doctrine, namely the book of Friedrich Paulsen, which can be verified by every reader.

Already in his rejection of the dogmatic anthropomorphism, Kant deviates greatly from Christian religion. One cannot, Kant thinks, define God's existence dogmatically by the form of human intellect and human intention. We cannot attribute to God a discursive reason similar to human reason, as he has no sensory perception to which things are given, but only an intuitive mind which sets up the objects by means of the intellect, as the mathematician sets up his topics. In the place of dogmatic anthropomorphism Kant puts symbolic anthropomorphism.

As art attributes to God the shape of man, not with the

belief of his really possessing it, but to make Him imaginable and representable, so theology attributes to Him the spiritual shape of man in its highest enhancement to make absolute perfection and godliness imaginable to us in this symbol, and to put it before our eyes as an ideal. And so speculative philosophy can also use this conception, not for an definition of his existence, but for an "understanding according to analogy". This also proves that the idea of God does not form a part of physics, but a part of ethics; in physics Kant is ready to let pass the independence of cause and effect, and the objectiveness of things.

And in this way it comes about that the preponderance of ethics is characteristic for Kant's religious philosophy: practical reasoning, a moral standard, is the acid test of the truth and of the value of all religions. Religions refer to revelation. Kant, however, admits only the following interpretation of revelation: the truth of every external revelation is to be tested and measured by the godly in us, by the agreement with the moral laws in us. The bible must be interpreted by ethics, not ethics by the bible. Even the Son of God we can comprehend only by his being in accordance with an idea of God within us. External testimonies, for instance miracles or prophecies, cannot be recognized as a conclusive proof, as a final judgment; all the more so because our knowledge of them is only obtained by word of mouth, which is not infallible, and also because the power of working miracles in itself lends no moral authority—according to church-doctrine even demons can work miracles.

Every church-doctrine has, according to Kant, a certain innate tendency towards paganism, in so far as this exists because of the designation of the external aspect of religion as essential. Kant says: What has no significance with respect to ethics is superfluous or dangerous. This applies **both**

to religious acts and to religious doctrines; all dogmas to which it is not possible to impart some ethical meaning, as for instance the doctrine of trinity, the resurrection of the flesh, and others of this kind, lie outside of pure reasoning belief.

As every one knows, Kant was severely reprovved in the governmental order of 1794 for "degradation of some of the principal and fundamental doctrines of the Holy Bible and Christianity".

The rescript in 1826 about religious instruction in the secondary schools (Gymnasien) is interesting. It says that the teacher must not lose sight of the fact "that it is the state's object to make true Christians out of the pupils of its schools, so that not only a so-called morality, merely floating in mid-air, and bereft of all profound reason must be aimed at, but also a God-fearing disposition built up on the well-founded knowledge of Christain gospel truth".

So Kant's meaning had been grasped; Paulsen thinks that these words are aimed directly at Kant. "It is the direct reversion of his demand to base religious belief on ethics" (1. c. page 391). Paulsen characterizes Kant's religious philosophy as a "cool and dispassionate form of religious life, as is often found where a strong and independent intellectual life is in connection with strict conscientiousness both of thought and of deed, the basis of spiritual life. This is also the religion of Lessing and Spinoza".

But Leo Schestoff, who, in my opinion, is one of the best interpreters of philisophy, goes still further in his judgment of this state of affairs.

Schestoff puts the plain question: "Has at least one of the philosophers acknowleged God?" And gives the following answer to this question: "Apart from Plato, who acknowledged God only partially, all the other philosophers **strove only after knowledge.**"

Schestoff comments upon the religious philosophy of some philosophers and arrives at the following conclusion: "We need not deceive ourselves. It is possible of course, to prove the existence of God by logical evidence and such proofs we have in abundance. But these proofs, like a certain kind of compliments, do not butter one's bread. Every time reason undertook the task of proving God's existence, it advanced as the first premise God's readiness to submit to the fundamental principles dictated to Him by reason. The proven God, independent of the qualities with which reason might not have endowed him, such as omnipotence, omniscience, and justice, was already God by the grace of reason."

What we have seen above in Kant, i. e. the transmission of the conception of God from the sphere of physics into that of ethics already begins with Aristotle, who taught that the accidental is hidden from reason. Schestoff says that Aristotle has not expressed himself quite clearly on this matter, that the accidental is not only hidden from, but also does not exist for reason, and that the accidental cannot form the subject of scientific thought. (We shall here omit the consideration of "chance" and the "principle of uncertainty" in modern physics.) For chance, miracle and revelation, reason substitutes necessity, repetition and lawfulness.

Hegel says that the truth in religion is perceived by imagination and by the emotions, in art by intuitive vision, but only in philosophy by the intellect. "Philosophy is in so far the form which is the highest, the most liberal and the most wise". The claims of reason are therefore more serious and more important. Reason claims to be the only and the last resort, it claims the right of ultimately judging all questions touching "to be".

Spinoza did not hesitate to write that though daily experience continually convinces us that the useful and

the harmful are allotted to the good and the wicked in like measure, yet humanity cannot give up the prejudice (of God's justice). It is easier for man to replace the phenomena in question by others that are equally incomprehensible to him, and remain in ignorance than to relinquish the whole structure of his conception of the world and to erect a new edifice. And so the opinion is formed that the ways of God are inscrutable.

These thoughts then permit Schestoff to express his opinion about the well-known proofs of Descartes. Descartes writes: "All objections that are generally raised by the atheists against the existence of God are either based on the ascribing of human feelings to God, or on the presumption of the human mind that it is so strong and so wise as to lay claim to the right of determining what God can and must do; thus, as soon as we realize that we have to consider our mind an a finite entity but the mind of God as something infinite and indiscernible, all these difficulties disappear as a matter of course".

Such assertions, says Schestoff, can only be advanced by some one who wants to hide the truth from humanity forever. To answer the customary assertions of the atheists who maintain that God suffers injustices to occur on earth, that God is indifferent to the victory of the dishonorable etc.—that which Descartes in fact thought in his own mind—to answer all this, Descartes was not able. Schestoff says that the trial of Galilei was still fresh in his memory.

To sum up: The scientific method leaves nothing common to God and man, as the spirit and the will of God are entirely different from human spirit and will. God is something apart, and so is man.

Even Hegel does not say what he really thinks, though he speaks of God in a jesting tone. ("For why should God not reveal himself to us, if we treated him a little seriously").

Only **the newer philophers, Schopenhauer and Feuerbach**, describe the real facts openly and candidly.

All in all the conviction remains that either not one of the philosophers believed in God, or that what they called God was not God.

Seen from this point of view Einstein's newspaper article "Religion and Science" ("Jewish Family Magazine", 32 nd annual publication 1930) deserves special interest. Einstein asks, what are the feelings and needs that have led man to religious thoughts and to religious belief? And the answer is: With primitive man it is fear, fear of hunger, wild beasts, sickness, and death. Primitive man does not know of the causal relations and his mind imagines anthropomorphous beings, who decide his fate. Thus arose the anthropomorphous idea of God. Not before the human mind has reached the second stage of evolution, do social sentiments form the source of religious thought; and thus arose the God of providence, who protects, decides, rewards and punishes, who comforts in misfortune, and guards the soul of the departed. It is the longing for guidance, for love and for support that nourishes the idea of God.

All religions—says Einstein—those of the primitives, as well as those of the civili2ed nations are cross-types of fear-religion and morality-religion. For all these religions the anthropomorphous nature of the idea of God is characteristic. Einstein confesses that from a certain point of view the antagonism between science and religion cannot be denied. For, any one who is convinced of the causal lawfulness of all happenings cannot assent to the idea of **a higher being that interferes with the lawfulness of the world's course.** He is sure to reject the religion conjured up by fear, as well as the religion based on morality. He likewise will deny a rewarding or punishing **God, because of the fact that the actions of man are determined by**

outward and inward necessity and that from the point of view of causality man is as little responsible for his actions "as an inanimate object for the motions it goes through".

But if one reproaches science for undermining morality one wrongs it; the ethical conduct of man is founded on fellow feeling, education, and social sentiment, and "needs no religious basis".

Now we pass on to Einstein's "third stage of religious experience", which is designated by Einstein as "cosmic".

I shall anticipate here and, in consideration of the thoughts of Sigm. Freud discussed below, emphasize already at this point that Einstein admits the subjective character of religious feeling; Einstein says that cosmic religiousness is difficult to explain to any one "who possesses nothing of it", all the more so, as it is not connected with an anthropomorphous conception of God. Only a few, only the chosen ones, the religious geniuses, possess a cosmic religious feeling. It is contained as a component in the old prophets, in some of the psalms of David, in Buddhism, etc.

What really is this cosmic religiousness then? Einstein says: "The individual feels the futility of human wishes and aspirations, and the sublimity and wonderful order which reveals itself in nature as well as in the world of thought". Individual existence becomes unbearable to him, he feels it as a prison and wants to melt into the entity of existence. Here we can feel the points of contact between Einstein and the ascetic who has withdrawn into himself, between Einstein and Spinoza. But Einstein goes a step further. He demands from art and from science that they should undertake the task of arousing this religious feeling in man and keeping it awake; there can be no other way of passing this feeling from man to man, since this cosmic religiousness cannot lead up to theology.

Considered from this point of view, there is, according to Einstein, no antagonism between science and religion.

Einstein asserts "that cosmic religiousness is the strongest and noblest mainspring of scientific research".

He motivates this in the following manner: the research-worker uses all his strength for scientific activity; it demands great effort. The explorers of the mechanism of celestial mechanics, Kepler and Newton had to possess, besides the strong belief in the intelligence of the world constructor, also a great longing for the understanding of world reason. Hence the research-worker exerts much effort in fields quite remote from immediate practical life.

According to Einstein it is cosmic religiousness which gives rise to such forces, which "doles out such strength".

Finally, Einstein quotes the words of the contemporary who has advanced the assertion that in our materialistic times the research-workers are the only deeply religious people.

The result at which Einstein now arrives, I consider on the one hand so important a judgment and on the other hand so characteristic of Einstein's spiritual life, that I shall now turn back to an essay of Einstein's from the year 1918.

What is the reason for the inexhaustible perseverance and patience of the scientific worker? Is this attitude to be traced back to extraordinary willpower and discipline? Not at all, replies Einstein: "The state of feeling which qualifies for such work is similar to that of a religious person or that of a person in love; the daily effort does not have its source in a purpose or program, but in an immediate need".

If at that time, in 1918, Einstein was not yet experiencing the disharmony of human society so painfully as he did later on, he nevertheless at that time already declared the flight from every day life as one of the strongest

motives for research: "In the first instance I believe with Schopenhauer that one of the strongest motives that lead to art and to science, is a flight from everyday life with its painful coarseness and dreary desolation, a flight from the bonds of one's own eternally changing wishes. The finely strung human being is driven out of personal existence into the world of objective observation and understanding; this motive may be compared to the longing which irresistibly draws a city person away from his noisy, confused surroundings into the quiet mountain world where the roving eye glides through the calm pure air, and clings to quiet lines, which seem created for eternity. But to this negative result, a positive one may be joined. Man tries in a manner somehow adequate to himself to create a simplified and clearly defined picture of the world, and in this way to conquer the world of experience, in striving to replace it to a certain degree by this picture. This is done by the painter, the poet, the speculative philosopher and the natural philosopher, each in his own fashion. Into this picture and its formation he shifts the center of gravity of his emotional life, thus seeking repose and steadiness which he cannot find in the too narrow circle of whirling personal experience".

In summing up we can now draw the following conclusion:

At that time, in the year 1918, Einstein took upon himself the rôle of the analyst; he analyzed the motives underlying the work of the painter, the poet, the philosopher, the natural philosopher, arriving at the conclusion that here it was a question of a state of feeling akin to religious feeling; now Einstein construed the theory that "cosmic religiousness was the strongest and noblest manspring of scientific research" • Scientific research is thus a consequence of religiousness. That state of emotion that causes research on one hand and religious feeling on the other are thenceforth identical.

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I want to draw particular attention to this direction, towards which Einstein's spiritual life and views have in time developed.

Finally, to complete the sequence of thought, I take the following out of "Gelegentliches von Albert Einstein" ("Incidentals by Albert Einstein"), presented on his 50th birthday, March 14th, 1929, by the Soncino-Society of Friends of the Jewish Book in Berlin.

The question of the motive of a new task, he answers thus: "Curiosity and craziness, otherwise no outside motives".

The question of the connection between artistic conception and the conception of the scientist, Einstein answers as follows: "The psychological impulse is probably the same in both cases, at least as regards the true creative work."

As regards his musical activity, Einstein says that this, as well as his research work, is nourished by the same source of longing and that they supplement each other with respect to the effect they accomplish.

Concerning his religiousness, Einstein says:

"My religion consists of a humble admiration of the inimitably superior spirit who reveals himself in the slight details we are able to perceive with our frail and feeble mind. Ethics are a most important matter, but only for us, not for God."

"That deeply emotional conviction of the presence of a superior reasoning power, which is revealed in the incomprehensible universe, forms my idea of God; in the conventional manner of expression it could therefore be designated as 'pantheistic' (Spinoza)."

I here pass over the fact that Einstein's religiousness is characterised not so much by the idea of God as by his deeply spiritual soul, not so much by the idea of God, as by his own religious feeling. It is only important to emphas-

ize the fact **here**, that Einstein's idea of God has nothing to do with the idea of God according to the existing religions and churches. Schestoff is fully and wholly satisfied here.

This short explanation will make it plain to the reader what is to be expected, if the question about God's existence is put to a thinker. At best the thinker would be able to point to his religious feeling, connected, of course, with his intellectual discernment; but if he wanted to be quite sincere, he would have to add that this religious feeling was his personal feeling, that other people (for instance Freud) could not ascertain this religious feeling in themselves.

Freud writes in a very interesting manner (Sigm. Freud, "Das Unbehagen in der Kultur" 'The Discontent in Culture', Vienna 1930), that he sent his work about religion from the standpoint of illusion to his friend, whereupon his friend replied that he (Freud) had not given due value to the source of religiousness.

This, he maintained, was a particular feeling which never left him, a feeling of the "perception of eternity" a feeling of "something unlimited, as it were, oceanic".

This feeling was the source of religious energy of the different churches and religious systems. "One might call oneself religious on the strength of this oceanic feeling alone, even if one rejected every faith and every illusion."

Freud says that he cannot discover this "oceanic" feeling in himself.

If he has understood his friend correctly, it is here the question of a feeling of indissoluble amalgamation, of homogeneousness with the whole of the outside world.

According to Freud it is here the question rather of intellectual insight, certainly not unaccompanied by sentiment, but as regarded his own person he could not satisfy **himself as to the primary nature of such a**

feeling. Freud emphasizes the fact that the idea of **man** receiving the knowledge of his connection with the surrounding world by a direct emotion sounds so strange, fits so badly into the texture of our psychology, that a psycho-analytical, i. e. a genetic deduction of such a feeling, might be attempted.

But even admitting the existence of the religious feeling, it will be remembered that Kant's religious feeling for instance, could not prevent his being charged with blasphemy, and that this religious feeling of his did not lead to God but to morality.

Therefore, when I read Einstein's words, that there was nothing of the Jewish faith in him, this assertion first interested me as a confession with respect to prosaic reality. This question seemed so important to me that on a visit to Einstein I made it the subject of our discussion.

I put the following question to Einstein: "You arrive in a strange town; the police registration form is put before you; what would you write down where the statement of religious faith must be made?" Einstein answered: "In this case I should put 'Jewish' for here it is the question of a brotherhood of fate".

This answer did not quite satisfy me and I asked: "What is a philosopher to write on the registration form if, in addition, he inclines to Kant, but was not born of Jewish but of Christian parents?" To this Einstein gave the clear answer: "This philosopher must not, when registering, avow himself of the Protestant or Catholic faith, or, generally speaking, of the Christian faith at all.

## CHAPTER V.

# Einstein and Nationalism.

I am aware of the fact that as Einstein's biographer, I assume the duty of explaining wherein Einstein's Judaism consists. By the way I shall mention that this question often received an incorrect explanation.

What is the aspect of Judaism? I am treating this question with an impartial, purely scientific objectivity and I answer: The aspect of Judaism is a vibration-problem.

In England I was engaged in the field of wireless clock-regulation, and I was astonished how few people possessing a fine watch were acquainted with the mechanism of the watch, and knew why a watch is exact in spite of its spring being now more taut and now less taut.

But let us pass from the swinging pendulum of a hanging clock and from the vibrating balance of a watch, directly to the Jewish question.

Heinrich, Graf Coudenhove-Kalergi in his book "Das Wesen des Antisemitismus" ("The Essence of Anti-Semitism") proves decisively that the persecutions of the Jews in ancient times and in the Middle Ages were only aimed at their religion, and not for instance, at their racial qualities.

The old Romans had their difficulties with regard to their government of the Jews. We read in Coudenhove: "However obliging they were to the Jews, the Jews asked for more and more concessions, which however, because of the general order, were difficult to grant. In all the provinces of the Roman empire the cult of the emperor

was exacted from the populace, and unhesitatingly rendered by it. Only the Jews were exempt." Because reproduction of human likenesses was not consistent with their religion, the copper coins minted in Palestine bore no human likenesses. Apart from this concession made to the Jews, the Roman troops out of consideration for the Jewish religion, used to march into Jerusalem without the field-badges decorated with the Imperial pictures.

Pilate wanted to abolish this custom at one time, but he met with violent opposition; it even came to a riot and he had to remove the Imperial pictures.

The violent persecution of the Jews in Alexandria in the year 38 A. D. also had religious causes.

Caligula had ordered that his statue was to be set up in the Jerusalem temple. The resentment of the Jews was unlimited, and sanguinary riots would have arisen then and there. But the clever governor of Syria, Petronius, delayed the completion of the statue and meanwhile Caligula died.

The new emperor, Claudius, presented Judea and Samaria to Herod Agrippa.

When Agrippa found himself regent of all Palestine, he sided with the party of the Pharisees and strictly observed the precepts of Judaism. It was he who effected the removal of the Imperial statue from the synagogue of the Phenician town, Dora.

His daughter Drusila became affianced to Epiphanes, the son of King Antiochus; but then Epiphanes had to promise the Jews to have himself circumcised. When in the year 41 at the fest of the tabernacles, Agrippa had to read the words of the Thora, "Thou shalt not put a stranger, who is not thy brother as a king over thee", he burst into crocodile tears; but the people shouted enthusiastically: "Don't worry Agrippe, thou art our brother."

What is intolerance and lack of breadth? Coudenhove

believes that these qualities characterize the transition from paganism to monotheism. These qualities later on underwent a marked development in Christendom, and reached their climax in Islam. Today in all Mohammedan countries this sentence is accepted: "Revelation stands higher than reason." The scholar rabbi, Maimonides, was stamped as an heretic in 1232 in the synagogue of Montpellier; the same thing occurred after four centuries with Spinoza.

In Mohammedan countries the Arabic philosophers suffered the same persecutions.

We ascertain a triumph of orthodoxy over liberalism, a triumph of Pharisaism over Sadduceism in Palestine at the time of Christ, the latter party having quite disappeared afterwards. Orthodox Pharisaism is still alive today in Talmudism and Rabbinism. It is fanatical radicalism which is revived again and again in all religions, and is always able to maintain its ground.

At the time of Rome's sovereignty over Palestine, orthodoxy with the Jews was the pillar of the doctrine of their selection and of a future Messiah. From this high standard of feeling and of superiority over other nations, which had developed in the Jews through their religion in the course of several generations, the aspect of Judaism suffered a sudden downfall, which is as good as unparalleled in the history of mankind. Here I can limit myself only to the most characteristic moments in the history of Judaism and their causes.

The downfall of the Jewish state is characterized by Coudenhove in the following manner: "Intolerance, fanaticism, and added to it, the doctrine of their selection and of a future Messiah, who was to unite all peoples under the sceptre of a scion of the house of David, this is the nucleus of the history of the Jews since Babylonian captivity; these are the chief reasons that have led to the destruction of the Jewish state."

Together with Renan, Coudenhove denotes the Thora as "the great culprit" which has worked all the mischief. Thora alone had created a wall separating Israel from all other peoples. The Thora alone was responsible for the aversion of Greek and Roman literature to the Jews. The Thora alone disturbed the peace between the Jews and the tolerant Roman government.

The actual humiliations and persecutions of the Jews are closely associated with the intolerance of the "differently minded" which, as mentioned above, characterizes the transition of paganism to monotheism.

The persecutions begin with the conversion of the Roman emperor Contanstine (312—337) to Christianity. From then Christendom became the religion of the state. We read in Joseph Kastein's book, "A History of the Jews", which is dedicated to Einstein: "Not Constantine's change of faith is of interest in the history of the Jews, but the change of attitude towards Judaism. When he was still a pagan he respected other religions, when he had become a Christian he persecuted them for no other reason than that their belief was different from his." Here I can mention only some incidents of these persecutions on the part of Christianity.

The hostile decrees of Constantine and his successors laid the foundation to the sanguinary persecutions of future centuries. This, according to Graetz, was the first word that Christendom pronounced on the very first day of its victory.

In Byzantium the Jews were branded as the murderers of God and Graetz remarks: "Nevertheless one did not kill them, but tolerated them in order to degrade them, to make them wretched and stunted, so that they should serve as deterrent impersonations of their decline."

To understand what sensations this could arouse in the Jews of that time, we must realize, as Renan states, that

the first Christian generation was Jewish to the bone; it considered itself as representing true Judaism and never thought of wanting to be otherwise; it admitted only one distinction insofar as it believed the Messiah to have already come in Christ. The first Christians observed the Jewish law, practised circumcision, observed the dietary laws, visited the temples, celebrated the Jewish feast-days etc. (Coudenhove, page 145). .

The great enemy of the Jews, however, the Emperor Justinian, prohibited the Jews from holding Divine Service on Passover day, if it coincided with the Christian Easter holidays, so that it should not seem as if the Christians were celebrating the Jewish Easter (Passover).

In the second half of the 9th century all Jews were driven out of town by the Archbishop of Sens.

King Charles the Simple-Minded, presented all the possessions of the Jews to the church of Narbonne. The King of Burgundy, Boso, proved himself particularly generous—he presented the church with all the Jews of his country.

In Toulouse, the counts of this town showed their chivalry by giving the chief functionary of the Jewish community a violent box on the ear every year on Good Friday. Once the chief functionary collapsed in a faint.

Then came the crusades. Crusaders began their work of murdering and pillaging the Jews, since there was a deficiency of Mohammedans.

In Rouen the crusaders drove the Jews into the church, and those who did not suffer themselves to be baptized were killed.

Thousands of Jews died a martyr's death in Treves, in Speyer, in Worms, in Mayence, in Cologne.

In the year 1099 the crusading army took Jerusalem by storm; a horrible massacre took place on this occasion. Many Jews were driven into the synagogue and burnt to-

gether with it. In 1191, Philipp Augustus caused 100 Jews to be burnt alive.

In York the Jews went to their death voluntarily. They burned all their valuables, laid fire to the doors, and then killed one another. Five hundred people perished on this occasion and there was not a single Jew left in York. But already on the following day, the crusaders again murdered 57 Jews in St. Edmond. Twenty families of proselytes suffered death through dire.

When in 1236 Pope Gregory IX decided on a new crusade, the Christians fell upon many Jewish communities in Aquitania, sparing neither children nor pregnant women, and killed more than 3000 Jews. During the mob-massacres of the year 1328, six thousand Jews lost their lives.

It is not the place here to describe at full length the martyrdom of the Jews, the slaughter of the Maranes, i. e. the Jews who had been forcibly baptized in Toledo in 1476, when 1600 buildings and more than 4000 New Christians were burnt to ashes, or to go into full detail about the crimes of the Grand Inquisitor, Diego de Sermento etc. etc.

Heinrich, Graf Coudenhove-Kalegri writes: "Never perhaps since the world exists, have human beings offered passive resistance to the fury of their fellow beings with greater heroism than did the Jews during the great persecution of the 14th century. With very few exceptions they scorned to save their properties, their families, or their lives by the renunciation of their faith."

Also the reformation of the Christian Church brings no ray of light into this hell of suffering.

Often the opinion is put forward that Martin Luther was suffused with a fine religious feeling. Coudenhove knows how to undeceive us. He describes Luther's work "About the Jews and their Lies", published in Wittenberg in the year 1543. Luther gave the advice in it, to burn the synagogues of the Jews to the ground "in the honor of our Lord

and of Christianity"; after this the Christians should destroy the Jewish houses and drive the Jews "under one roof or into a stable like the gypsies"; all their ready cash should be taken from them; the Christians should show no weak charity to the Jews. Luther's most ardent desire was to assemble all the Jewish scholars and the best among the Jews, and with the threat "of cutting out their tongues at the backs of their throats, to prove that Christendom teaches only of one God and not of three". Luther set the robber-barons at the Jews.

And if Luther protested at a certain ecclesiastical congress that he stood there, believed thus, and was not able to do otherwise, he proved by these sentences that he could very well act otherwise.

Coudenhove-Kalegri concludes: "If we compare the attitude of Luther and the Protestant church against the Jews in the Middle Ages with that of the Roman church, the fact strikes us that the latter was incomparably more human and more tolerant towards this unhappy people than the Protestant church. Nothing is more incorrect than the assertion that (true orthodox) Protestantism is more enlightened, more liberal and more tolerant, than the Roman church."

The Parsees suffered a fate analogous to that of the Jews. The persecutions here arose from the side of the third monotheistic religion, i. e. from the side of Islam. In 628, Mohammed sent letters to the Negus of Egypt, to the Byzantine emperor Heraklias, and to the King of Persia, Chosroes Parviz; in these letters he urged them to embrace Islamism. The Persian king did not answer the letter and tore it to pieces.

This resulted in the Arabs conquering Persia in the year 641 and the dynasty of the Sassanides coming to an end. After the war had cost more than 100,000 Persians their lives, Mohammed left the vanquished foe to take their choice between embracing Islam and emigration.

A considerable proportion of the Persians preferred to forsake everything and to emigrate. The Parsees migrated to India. Like the Jews, the Parsees distinguished themselves in India by a certain austerity in their mode of life, by charity, and by a striving for learning, expecting — says Coudenhove—everything from progress and civilization to which they, like the Jews, owed their equalization of rights. Here as there, the conception of their nationality coincides with that of their religion.

All in all, if we consider the persecution of the differently-minded and of the philosophers within their own nationalities and the monstrosities committed against other nations, we arrive at the conclusion that the monotheistic religions, more correctly their respective churches, have done more harm than good to humanity. They have undermined the religious feeling innate in man and made the formerly suppressed hostile feeling between man and man grow into a grotesquely distorted picture.

What is this feeling? Sigmund Freud describes it in the following manner analytically: "He, my neighbour, does not seem to have the least love for me, does not show me the slightest consideration. If it be a gain for himself, he has no compunction about harming me, he does not even trouble himself as to whether the extent of the profit he gains is equal to the extent of harm he does me. In truth he needs not even profit by it; if he can only satisfy any desire by it, he does not mind mocking, offending, slandering me, flaunting his power over me, and the more secure he feels, the more helpless I am, the more surely I may expect such behaviour from him towards me."

I mention this only to prepare the reader for Einsteins nationalism and his cosmic religiousness and now pass on to the question of the aspect of Judaism in history and to Einstein's relation to this question.

The come down which the Jewish self-reliance has

suffered from the high level of the doctrine of selection, reached its lowest ebb in Europe in 1215, according to Graetz. The Jews—according to this scholar—became used to a humble position, lost their self-reliance and self-esteem, came to treat the language carelessly with the time, lost their manly deportment and courage, and by and by became despicable, just as their enemies desired.

Friedrich Nietzsche expresses himself even more grossly: "We wanted to make them despicable by treating them with contempt through two thousand years and forbidding them access to all honors, to everything sublime, only pushing them further into filthy occupations —and verily they did not become any cleaner by this procedure. But despicable? They themselves have never ceased to think themselves destined for the highest ends . . .!"

However interesting Friedrich Nietzsche's treatise "Of the Tribe of Israel" ("Morgenrote", 'Aurora', third book, chapter 205) may be, we perceive at once that Nietzsche throws all the character traits of the Jews into the same pot. To be sure, up to the present day, the Ghetto-nature has not yet disappeared in the majority of Jews, but great exceptions are already to be found, i. e. exceptions not only of an individual nature, but whole communities have already lost the Ghetto-nature. The Jewish aspect changes from epoch to epoch. At the time of which Graetz speaks, it reached the lowest point of its oscillation: there could at that time be no question of the feeling of vocation to the highest end of which Nietzsche speaks. They were despised in order that they should be made despicable and, at the epoch of which Graetz speaks, their enemies had attained this object; and it was not perchance on account of an intellectual or moral inferiority that people despised them, but it was simply the greater numbers of the enemy who practised their petty feeling of hostility on the defenseless minority. (See the above quotation from Freund.)

^Now the swinging pendulum of Jewish fate, of the aspect of Judaism, slowly returns.

But as we have begun to speak of Nietzsche's treatise, we shall first linger over it for a while. Nietzsche says: "We still notice by their manners that one has never instilled chivalrously aristocratic sentiments into their souls and ornamented their bodies with splendid weapons; something obtrusive in them alternates with an often affectionate, nearly always painful servility."

Nietzsche corresponded with the Jew, Brandes; did he perceive in Brandes "the obtrusiveness" and "the painful servility"?

Is this characterization true for the idols of the great European masses, for the Jews, Karl Marx and Lasalle? (I may mention by the way, that Lasalle was killed in a duel that he had provoked to protect the honor of a lady.)

The reader perceives how dangerous it is to characterize the mass of a people "sub specie aeternitatis" in a purely static manner instead of describing the single historical epochs individually.

Nietzsche believes now, that there is no need of looking pessimistically into the Jewish future; from year to year the Jews become related by marriage—he says—to the best aristocracy of Europe and will soon have an excellent heritage of spiritual and physical good manners: in a century they will look distinguished enough as masters not to awaken a sense of shame in their subordinates.

No, history has taken a different turn!

It was spiritual treasure which the Jews acquired by and by.

Almost imperceptibly the other nations adapted themselves to the fact that the Jews often took the leading part not only in the field of political economy and finance, but also in the fields of technics and science.

In ancient times, humanity did not foresee what a place

of eminence, what glory and honor, even riches and immortality could be gained by science.

The swinging pendulum of the aspect of Judaism rises, if only in a few exceptional cases, from its lowest level, mentioned above, to the highest point of power and mental superiority.

I here quote (to remain objective here as well and to bring in some one else's opinion) the following words of R. N. Coudenhove-Kalergi:

„Meanwhile Germany clings to the anti-Semitic viewpoint and erects one theory after the other around this prejudice. It maintains now as ever, that Judaism produces only talent but no geniuses—although the genius now living who has received the greatest acknowledgement is a German Jew, Albert Einstein. And the most celebrated living Austrian, a second Jew, is Sigmund Freud.“

Here the retro action, i. e. the question to what extent Einstein has exercised an influence on the increase of self-confidence among the mass of the Jews, and in the first place the preliminary conditions of this influence, are of interest to us.

The Jewish nation has always identified their nation with their religion.

This induces Einstein, as we have seen above, to avow himself of the Jewish faith on his registration form, in spite of the fact that he has nothing in common with it.

And while Einstein's attitude towards religion would, in a former epoch, have been fully and wholly sufficient to provoke the synagogal anathema against him, as was the case with Maimonides and Spinoza, the new brings a quite different reaction: in spite of Einstein's complete rejection of the Jewish faith, the Jewish community used the fact of Einstein's registration form and made him play the violin in the synagogue during evening prayer.

The undertaking in the immense new synagogue in Berlin,

Oranienburgerstrasse, on January 29th 1930, was officially designated as "Synagogue-concert for the benefit of the welfare department of the Jewish community", but as I already mentioned above, it here also was a matter of evening prayer. Every seat was booked in the immense synagogue. It was not easy for me to obtain a relatively cheap seat.

It is to be imagined, how great the enthusiasm of the mass of Jews was, and how much discussion there was about it even a long time afterwards.

If we want to find out the connection between the national feeling and the religion of the nation, we have to investigate an epoch of time during which the nation was particularly threatened. We read in Kastein (page 429): "The function which the Jewish law had fulfilled in the beginnings of the Diaspora, namely preservation of the species among the Jews in a non-existing state, is here augmented quite deeply into the religious. The law becomes the pole and basis of the religious. Redemption is attained by faithfulness towards the commandments; service before God through obedience without looking to the left or to the right, without asking, brooding or doubting; not understanding, but resolve."

The translation of the national into the religious appears with special clarity in Buddhism. Whoever desired to enter the community of Buddhists, spoke these words three times: "I take my refuge with Buddha; I take my refuge in the doctrine; I take my refuge with the community."

The creed of this holy trinity was later gathered in three articles, of which one referred to Buddha, the second to the doctrine, and the third to the community; to this was added in the fourth place, the expression of the will to hold fast to the commandments of the holy life.

Hermann Oldenberg in "Buddha, sein Leben, seine

Lehre, seine Gemeinde" ("Buddha, his life, his doctrine, his community") 7th. Edition 1920 opines however, that this formula of the holy trinity does not go back to the time of Buddha's life, but that its origin bears a relation to the very changes which his death brought to the community of his disciples. For as long as Buddha was alive, he and his doctrine alone, represented the refuge of the believers. His death changed everything. Now the community represented the sole bearer of Buddha's ideas; it alone was the possessor of the redeeming truth and whoever wanted to partake of this truth also had to take refuge with the community. By the possession of the sanctuary, the community as such was raised into holiness, into religiousness. If the community was threatened by a danger this religious experience was augmented.

In our era of godlessness, of religious hollowness, nationalism takes the place of religiousness. Nationalism becomes a substitute for religion and the more a nation is threatened, the more the national feeling serves as a compensation of a feeling of inferiority, while on the other hand however, the national feeling becomes the substance of the constantly waking religiousness.

In this sense the journalist, Colin Ross, has recently expressed himself, and this conception is led up to particularly by an essay of George Simmel which appeared about 15 years ago.

The nationalism which Einstein preaches to the Jewish masses also belongs to the same type but in order to go into this any deeper, we have first to return to the subject of the religious for a short time, and to characterize 'religious nature'.

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We have seen above, that science did not permit the idea of the rewarding and punishing God, in general, the interference of God with the actions and the life of mer,

to gain any ground. Likewise the idea of the miracle as a proof of God's existence was rejected by science, and the legitimate, the necessary, and the causal principle, put in the place of the accidental. God is something apart and so is man.

The "theological distortions" by which "religion was remodeled to a scientific system, which resounds with quarrels and recriminations everywhere", Spinoza, and with him Kant, rejects.

Here the philosophers proceed with an almost revolutionary obstinacy; Spinoza says: "The theologians exert all their efforts to squeeze their wishes and myths out of the Bible, and then to cover their interpretations with the shield of divine authority. No other work is done by them with such a small degree of conscientiousness, and with so much superficiality, as the explanation of the Bible and the thoughts of the Holy Ghost." Kant uses expressions which are much stronger, which are hardly fit any more for polite society.

The question was once put to me, why Heinrich Heine, who in his "Disputation" between the rabbi and the monk distinguishes so objectively between the points of view represented by them respectively, ridicules everything in the end by letting Donna Blanka answer the king's question as to which of the two is right, with the following words:

"Who is right, I do not know—  
But I almost incline to think,  
That the rabbi and the monk,  
One and both emit a stink."

This is not mockery. It is holy earnestness.

It has already been intimated above that if one ignores the "theological distortions" in the sense of Spinoza, the Jewish and the Christian religions are identical, with the only difference that according to the Christian religion, the Messiah has already come in the form of Christ. For

both religions an anthropomorphous conception of God is characteristic; in both religions God appears as the judge who rewards and punishes, in short, comes into contact with the human himself; both religions mediate between man and the supernatural; there is no contrast here between the Jewish and the Christian religion, the contrast existing rather between the Jewish-Christian religious content on one hand and reason on the other.

If philosophy did not let the idea of the contact between man and God gain ground, the philosophers, up to the beginning of the 19th century, devoted themselves all the more to the moral of religion. We read in Spinoza: "Without any difficulty or sophistry, the dominating biblical thought is revealed as the teaching: to love God above all and to love our neighbour as ourself. This teaching cannot be the creation of a falsifier or of a precipitant or erring pen."

This lofty moral, however, did not find any echo in the politics of the churches. We read in R. N. Coudenhove-Kalergi ("Held oder Heiliger", 'Hero or Saint', Pan-europa Verlag 1929): "The attempt to convert Europe to Christian ethics failed . . . Europe has conquered the world not because it was Christian and civilized, but because it was pagan and barbaric . . . The entire political history of Europe is a history of the mockery of Christian ideals."

The motives for this behaviour, R. N. Coudenhove-Kalergi sees in the racial traits, in the bitter struggle with neighbouring countries, in the paganly heroic ethics of the Europeans, in their economic situation etc.

To wind up this train of thought in my representation, I quote his following specifications:

"In spite of their acceptance of Christendom, the knights and their descendants in whom the Germanic elements of character were the strongest, could not deny their pagan blood and their heroic ethics.

In spite of their battle against Christendom, the **Jews** could not deny their blood-relationship with the founders of Christendom. Even without Christian belief, the Jews today are the bearers of Christian ethics in Europe, champions of humanity, of brotherliness, of peace, and of justice."

My task here is to throw light on this problem from another angle: for the European soil, for the pagan-heroic nature-elements of the European, Christian ethics were too abstract. In order to understand this, I choose for comparison the Buddhistic ethics of reconciliation.

Buddhism does not, perhaps, demand that one should love one's enemy, but that one should not hate him and should look upon him with calm benevolence. Buddhism cultivates this benevolent mood toward the whole world. The fusion with the "AU", with the whole world, (which with Einstein corresponds to the "cosmic religiousness") has arisen from reasons of expediency: "Whoever is able to keep under control the anger which rises within him—teaches Buddhism—as he would control a rolling chariot, him I call the true charioteer; another is only one who holds the reins: by not growing angry one should conquer anger; by good one should overcome the bad; by gifts ohne should overcome the miserly; by truth one should overcome the liar. He who is abused by the wicked, should say: they are good, they are very good, that they do not beat me."

Here the reader feels the relationship with Tolstoy's passive resistance.

If we follow the tale about the king who was driven out of his kingdom by his powerful neighbour Brahmadata—this story was once told by Buddha to his quarreling disciples—we recognize the pedagogic instructive character of this moral.

The question as to whether there are miracles, Buddhism answers ("Buddhistischer Katechismus von Subhadra Bhikshu", Verlag von Max Altmann, 1921), in the negative: No. A miracle in the strict sense of the word would be an arbitrary breaking through the natural laws by some super-human being. Such a thing cannot occur. Buddhism teaches the lawfulness of all happening without exception. To this lawfulness, even the highest gods are subject.

It is particularly interesting how Buddhism answers the following question: "Did Buddha teach that only adherents of his own religion able to attain salvation?" This question also is answered in the negative: No. Buddha proclaimed the reign of the moral cosmic system, of eternal justice. Not the profession to this or that religion decides the fate of man, but his inner merit alone, his way of thinking, his deeds, the degree of his understanding, in short, his moral character. Buddha is the true guide who indicates the right way, the shortest way.

The catechism then soon comes to the question: Which position does Buddhism occupy towards the followers of other religions? And the answer is: "It commands us to regard all men, of whatever race, nationality or faith they might be, as our brethren, to respect the convictions of the heterodox, and even to avoid all wrangling about religious matters. The Buddhist doctrine is full of the spirit of purest tolerance; never was any bloodshed committed for its propagation, never, upon attaining power, has it persecuted or oppressed members of another faith."

We can understand that this system of ethics must prove convincing without our appealing to God.

I thing I can even maintain that, if the great masses of the people had been conversant with Buddhism, not a single Pope would have dared to organise crusades.

I now come to the question as to which part the conception of God finally played with the philosophers, and

again turn to Spinoza. We read in Spinoza: "By God I understand the absolute infinite being, i. e. the substance consisting of an infinite number of attributes. Every attribute expresses an eternal and infinite essence . . . God is the inner, eternal, but not the accidental, temporally passing cause of all things."

We read almost the same in Newton, in the concluding observations of his "Optics" :

"After all these reflections it seems probable to me that God, at the beginning of all things, created matter in the shape of massive, solid, hard, impenetrable and movable particles of such size and shape, with such qualities and in such proportion to space, as led to the final purpose for which he had created them, and that further, these primitive particles, because of their solid state are incomparably harder than any porous bodies composed of them, in truth so hard that they can never deteriorate or break, for no power of an ordinary kind would be able to split up what God himself created as a whole at the first act of creation."

We see that there is no connection with morality here, that here there is no question of morality. It is simply the question of God, the Builder. Einstein drew his logical conclusions and wrote that religion needs no moral basis. If, therefore, the philosophers had up to the 19th century struck out all the predicates of God and only allowed as valid the designation of God, the Moral, Einstein struck out even this last predicate.

The dividing cleft between Einstein's cosmic religiousness and Buddhism, consists of the following:

Einstein's merging with the entity of existence approaches the moral law of Buddhism:

"As the mother protects her only son  
With her own life,  
So for all beings he should awaken  
In himself unlimited feeling."

Owing to the above mentioned reason, these two views do not fully coincide.

We ascertain, however, that between the Buddhist problem of salvation and Einstein's cosmic religiousness, there is no conflict of opinion because

i. The philosophical God does not come into contact with man.

2. Buddhism on the other hand, "teaches the greatest kindness and wisdom without a personal God."

The Buddhistic salvation-problem is in short: "Highest understanding without revelation ... a future existence without an immortal soul ... eternal bliss without an actual heaven ... a possibility of sanctification without a delegated saviour.. a salvation whereby every one is his own saviour, which can be attained without prayers, sacrifices, penitential exercises and outward ceremonies, without ordained priests, without intervention of the saints and without a divine act of grace, and which can be attained already in this life and on this earth." (Catechism, page 91. compare: "Die Reden 'the speeches' of Gotamo Buddha." Munich 1922, R. Piper & Co., second volume, Subho, page 808).

The dividing cleft does not run all the way through. Spinoza, Newton, Kant, Einstein, and many others need the idea of God as the cause of everything that occurs, while Buddhism is solely based on a sense of reality. It declares that "such knowledge surpasses the power of human understanding and is beyond conception", maintains that the non-existent can never turn existent or give rise to existence and regards "the doctrine of a creation out of nothingness as a delusion".

The Buddhist denies the personal God of all the religions of the world and feels quite content over it; he does not feel any void. The European philosopher started from his monotheistic inheritance and crossed out one predicate

after the other from the idea of God in monotheism, what was left having nothing to do with the monotheistic God. Schestoff is right in saying that not a single one of the philosophers believes in God (i. e. the God of monotheistic religion) and when Spinoza suddenly declares: "One cannot but love God", Schestoff remarks thereto that this is Spinoza's private affair; it does not result from his conception of God.

We have seen above, that Einstein found an expedient for Spinoza's amor dei intellectualis in his assertion "that cosmic religiousness was the strongest and noblest motive for scientific research".

The conclusion which forces itself upon us is truly wonderful.

The philosophers denied the God of the monothestic religions, permitted the idea of God to become more and more abstract and yet withal, have deeply religious natures; the Buddhists entirely ignore the conception of God and likewise have deeply religious natures.

What then distinguishes a religious man from an irreligious one?

The question is discussed by George Simmel in his very remarkable treatise, "Das Problem der religidsen Lage" ("The Problem of the Religious Situation").

Freud, as well as George Simmel, quotes the words of Goethe:

**"He who possesses science and art  
possesses also religion;  
He who does not possess these two  
should have religion 1"**

George Simmel and Sigmund Freud quote the words of Goethe independent of each other; independently, because Simmel wrote the above mentioned treatise a long time ago and Freud, who brings this quotation only

in 1930, can be ascertained to have been quite ignorant of Simmers treatise.

Freud interprets Goethe's words in the following manner: "This passage on the one hand brings religion into opposition to the two highest accomplishments of man, and on the other hand it asserts that they can substitute or replace each other with respect to their vital value."

No! Decidedly not! It is not a question here of equivalence or substitution. We can conform to the need appearing in religious form, says Simmel, in a moral, aesthetic or intellectual manner "which, however, in no way corresponds to turning it aside or muffling it".

A "religious nature" holds religion not as a possession nor as a faculty, but its substance is a religious one, it functions religiously so to speak; the feeling of dependence and of the joy of hope, the humility and the longing, the indifference towards everything earthly and the regulation of life—all this, says Simmel, does not yet represent the deepest religious feeling in a religious man; this is still something just arisen out of his own self; his religious self lies much deeper still.

Simmel has found a beautiful comparison; as an erotic nature will always love only one individual, although it had already possessed an erotic quality before, so a religious nature always feels in a religious manner and shapes life differently from an irreligious nature.

With a religious man the psychic phenomena can only unfold as dipped in the hue of religion, just as the movements of a graceful person are already graceful in themselves.

Simmel thus distinguishes a religious need and its fulfilment. And while the need is the decisive part, its appeasement can on principle be possible in different ways. Hence it follows: science, philosophy have attacked the religious substance, have unfurled the "question of truth",

a struggle arising about "truth or illusion" and on this level, to which the religious substance was transposed, religion collapsed without the religious need being appeased.

Formerly, owing to the religious longing, which humanity possessed ever since the first dawning of its history up to our era of culture, religion acted as intermediary between man and the other world, between man and God. Religions changed, but this contact with the other world, with God, remained. From the standpoint of the conception of the inconceivable, of the direct or conveyed experience of the super-empirical, there is—says Simmel—no difference between Vitzliputzli and Ormond, between Baal and Wotan, or between the Christian God and Brahma.

If philosophy prevents the profession to one of these creations on principle, it does so also with respect to the other.

Formerly one religion survived the other, i. e. one form of transcendence survived the other; now the surviving part is not a form of transcendence "but something deeper and more helpless"; the religious need.

It is important that it is not the religious nature that is affected by the arising void; this is similar to a flame which cannot be extinguished; it bears abundance in itself; only that man is threatened, of whom Goethe said: "he should have religion".

Whether we take up some poem about the liberated Prometheus, whether we become absorbed in some scientific theory or construction, which cannot subsist without the elements of faith, (See Planck's opinion in the last chapter and further, Einstein's opinion about the theory which is led up to by no logical path) whether we are present at a rendering of the "Danse macabre" of Saint Saens, everywhere we feel the religion of their authors. If is different in the case of the commonplace individual of whom this

is true: He who has not God in himself, must have him outside himself; he must have the transcendental before him; he must have the dogma; if he limits himself to the Sunday visit to church, Simmel designates this as the caricature of the separation of religiousness from life. This can only be achieved through separation of the religious substance from life, while with the "religious nature", religion is "life itself".

If we further analyze religious nature and particularly the creators of the religious, we recognize the genesis of religion. According to Simmel this *is* the misery from which man cries out to God, the dearth of life from which man seeks profusion, liberty, infinity, and the abundance, the over-flow of life that craves for expression.

Just as Plato represents Eros as the son of poverty and wealth, so perhaps, in every religious revelation, both instances act conjointly.

Some of Einstein's thoughts with respect to the sphere of religion may now be summarized. In his formulation that the impetus to any new scientific work consists in curiosity and possession, no connection with religiousness exists as yet. The flight from every day life, designated by him in 1918 as the motive for research, already contains, as it were, something of the nature of spiritual asceticism. In the year 1930 he speaks of cosmic religiousness as the strongest and noblest motive of scientific research. Here he already sanctifies the activity of the research worker and the artist. At the same time the complete severance of the religious state of feeling from the substance of religion is expressed by Einstein, as well as by Simmel and Goethe. This severance also remains existent when Einstein (in 1932) takes new instances of the religious state of feeling into consideration, as these new instances characterize not only the state of feeling of the monotheist, but also that of the scientist: "The most beautiful thing we can

experience—says Einstein—is the mysterious. It is the fundamental feeling that stands at the cradle of true art and science. He who does not know it and cannot wonder, cannot marvel any more, is dead, so to speak, and his eyes have grown dim. The experience of the mysterious—even though mixed with fear—has also begotten religion. The knowledge of the existence of what for us is impenetrable, the manifestations of profoundest reason and most brilliant beauty, which are only accessible to our reason in their most primitive forms, this knowledge and feeling constitutes true religiousness; in this sense and only in this sense, I am one of the deeply religious."

In the place of the disappearing ancestral religion, which united the Jewish mass, Einstein supplies them with a national self-confidence that is destined not only to be the new religion of the masses, but also a stronger link among them. What Einstein gives to the mass is like a sermon which awakens the noblest sentiments.

Einstein's activity in this direction begins with his article in the "Berliner Tagblatt" in the end of 1919, where he vigorously takes the part of the Jews from the East (Ost-Juden) against whose immigration into Germany sharp measures were to be taken. Einstein suggests that the battle should not be conducted by means of slogans which only serve to strengthen the impression "that sober judgment is clouded by the strong anti-Semitic instincts, and that at the same time the method is chosen to divert attention from the real problems and the true causes of the general economic depression by influencing the mood of the people."

This was followed, of course, by a spiteful reply on the part of the "Deutsche Tageszeitung".

At the beginning of 1920 the "Zentralverein deutscher Staatsbürger jüdischer Glaubens" ("The Central Associa-

tion of German Citizens of Jewish Faith") invited the lecturers of the Berlin university to a conference which was to be devoted to the combat of anti-Semitism in academic circles. The invitation which was sent to Einstein as well, he answered with the following letter dated April 3rd, 1920.

"To the Central Association of German Citizens of  
Jewish Faith.

April 3rd, 1920.

Today I receive your invitation to a meeting on the 14th inst. which is to be devoted to the combating of anti-Semitism in academic circles. I should come gladly if I believed in a possible success of such an undertaking. First however, the anti-Semitism and the servile disposition among us Jews in our own ranks would have to be combated by enlightenment. More dignity and more independence in our ranks! Not till we dare to regard ourselves as a nation, not till we respect ourselves, can we gain the esteem of others, or rather it will then come of its own accord. There will be anti-Semitism in the sense of a psychological phenomenon as long as Jews come into contact with non-Jews—what does it matter? Perhaps we owe it to anti-Semitism that we can maintain ourselves as a race, I at least believe so.

If I catch sight of an expression like "German citizens of Jewish faith" I cannot help smiling a little sadly. What is there to be found in this pretty label? What then is Jewish faith? Does there exist a kind of unbelief by virtue of which one ceases being a Jew? No. But in this indication there are two confessions of a fine soul, i. e.:

1. I don't want to have anything to do with my poor Jewish brethren (Ost-Juden).

2. I do not want to be taken for a child of my people, but only as a member of a Jewish community.

Is this sincere? Can the "Aryan" feel any respect for

such sneaking fellows? I am neither a German citizen, nor is there anything in me which can be designated as "Jewish faith". But I am a Jew and am glad to belong to the Jewish people, even if I do not consider them in any way as God's elect. Let us calmly leave anti-Semitism to the non-Jew and retain our love for people of our kind.

I hope you will not frown on account of this confession. No harm or unkindness is meant.

With sincere respects,

(signed) A. Einstein."

This letter did not lack its effect, while the answer to Einstein's letter, in which he had been reproached with denial of the Jewish faith, almost with being a renegade, remained without an echo.

In the preceding chapter we have seen that Einstein sometimes, out of solidarity, designates himself as belonging to the Jewish faith. It stands to reason that from the point of view of the prevailing religions, he is undenominational. It is of importance, however, that he tries to avoid everything that would indicate a rupture with the Jewish national body. To this purport he answers a letter of the Prague pharmacologist, Professor Starkenstein, in 1921. I here cite Einstein's letter, which was worded as follows: "Dear Professor,

"I think that belonging to a denomination is in itself quite unimportant. It is only that with us Jews the embracing of another faith is a symbolic action, which means, that we want to sever ourselves from our people. Freedom from any denomination, however, one can very well profess without being unfaithful to one's own people (in my opinion at least). I myself belong to no denomination and consider myself a faithful Jew.

"In how far we Jews should consider ourselves as a race or a nation respectively, in how far we form a social community by tradition only, on this subject I have not yet

arrived at a decisive judgment. It suffices that we form a social body of people which stands out more or less distinctly from the rest of humanity, and the reality of which is not doubted by any one.

Most cordial greetings,

Your

(signed) A. Einstein."

Einstein espouses the Zionistic movement. Later *in* 1929 Einstein briefly remarks in a very interesting letter that his Berlin surroundings had given him to understand that he was a Jew and that he had very well caught their meaning.

I shall, however, continue with my description in chronological order.

Einstein's Zionistic Credo was published in the year 1921. His article to that effect is entitled: "How I Became a Zionist. By Albert Einstein." The editorial office of the "Juidische Rundschau" (Jewish Review), where his Credo was published, remarks on this subject: "The article was written during Professor Einstein's stay in America and therefore before his visit to England." Einstein emphasizes the fact that it is just the educated circles in Germany who have made themselves the bearers of the anti-Semitic movement. "They have even built up a "science" of anti-Semitism, while the educated people in Russia, at least before the war, were in general philosemitic, and often honestly exerted themselves to combat the anti-Semitic movement."

Einstein explains this to a certain extent by the fact "that the Jews exert an influence on the intellectual life of the German people which by far exceeds their number . . ."

"Frequently anti-Semitism is a question of political calculation. It often depends only on the party to which some one belongs, as to whether he will profess himself

an anti-Semite.." "While in America anti-Semitism assumes only social forms, political anti-Semitism is even more strongly noticeable in Germany than social anti-Semitism.."

Einstein advises the Jews about the attitude they should maintain and the consequences they should draw. "First of all they should display a certain distinguished reserve and not be so very much bent upon social mingling with which the others do not want to have anything, or at least very little to do." On the other hand, Einstein welcomes that effect of anti-Semitism owing to which the Jews are apart and do not assimilate themselves and he continues: "Without this antagonism the fusion of the Jews with the rest of the populace would advance quickly and without hindrance in Germany. I have noticed that in myself. Up to seven years ago I lived in Switzerland, and as long as I was there I was not aware of my Judaism and there was nothing in my life that would have effected and stimulated my Jewish feelings. This was changed as soon as I had moved to Berlin ..." "I am not a national Jew to the extent of demanding the preservation of the Jewish or of any other nationality as an aim in itself. Rather do I regard Jewish nationality as a fact and I am of the opinion that every Jew has to draw the consequences of this fact. . ." "Only the unbroken vitality of the masses of American Judaism has made me recognize distinctly how sickly German Judaism is. . . But my Zionism does not exclude cosmopolitan views."

Einstein emphasizes the fact that Zionism strengthens the dignity and self-confidence of the Jews, and speaks of their own national renaissance occurring with the help of the Hebrew University and similar institutions.

On the 27th of June 1921, Einstein spoke in the Berlin Bluthner Hall on the subject of the rebuilding of Palestine, which represented "the incarnation of the reviving national feeling of unity among all Jews".

The effect of this speech, the enthusiasm of the audience, cannot be expressed in words.

Already some time before, i. e. on March 30th 1921, the "Judische Rundschau" brought an interview with Einstein about the University of Jerusalem and the multitude was informed of the new center of culture in the Orient.

In the autumn of 1922, a short notice appeared in the newspapers saying that on September 28th, 1922, Einstein had left for Japan to hold lectures there and that on his return journey he would visit Palestine.

I select the following notices from the "Judische Rundschau":

On November 2nd, Einstein arrived in Singapore in the company of Mrs. Einstein.

A reception took place in his honor, representatives of all circles of the population, as well as the Bishop of Singapore taking part in it.

In his answer to the speech of welcome, Einstein spoke (among other things) of a Hebrew university, which did not fail in its effect; large sums were subscribed for the university.

On February 7th 1923 Einstein delivered a lecture on the theory of relativity in Jerusalem in the building of the Hebrew university. The lecture was attended by Sir Herbert Samuel and several government officials, by a number of leading personalities in Jerusalem, and by the representatives of Jewish society as well as by middle-class Christian groups. The Arabian personalities, who had also been invited, did not make an appearance.

About March 10th, 1925, Einstein started for the Argentine to hold lectures at the State University there. On this occasion Einstein also tried to interest the Jewish circles of the Argentine in the matter of the rebuilding of Palestine.

On January 20th, 1926, Einstein was received in Paris

by the French society " France -Palestine" to which belong the French Minister of State, Painleve, and other leading personalities.

Besides the chairman, Minister Godart, the rector of the Sorbonne, Professor Lapie, Professor Brunshwig, Professor Charles Gide and the socialistic leader, Leon Blum were present. Einstein held a lecture about the Jerusalem university.

His fiftieth birthday on March 14th, 1929, was celebrated as a national holiday by the most diverse Jewish circles.

The innumerable congratulations of many Jewish associations were replied to by Einstein with cordial letters, in which he always emphasized his close contact with Judaism. Einstein's letter of March 19th, 1929, to Mr. Ussitschkin (See: "Judische Rundschau" No. 28, 1929), was particularly interesting in this respect. The enthusiasm reached its culmination in the Albert Einstein celebration organised by the Jewish populace of New York on April 16th, 1929.

I have already mentioned above, that the President of the United States, Mr. Hoover, sent his congratulations on the occasion of this celebration.

To give a clear picture of Einstein's influence on the improvement in the prestige of Judaism however, I may mention President Hoover's message to the Jews of America on the occasion of the Jewish New Year's festival: "I send my cordial greetings to the loyal and devoted Jewish population, which is about to celebrate the New Year's festival in the following days. The Jews have contributed to human progress by countless invaluable works; among these works their contribution to the intellectual life of humanity is the most important. All fellow-citizens, irrespective of their belonging to different races and religions, unite to express to the Jews their cordial sentiments

and their congratulations on the occasion of the Jewish New Year's festival."

Above, the problem was raised, as to which relation Einstein's appearance on the horizon bears to the aspect of Judaism.

It will suffice to mention that this message of Hoover's was the first public demonstration of sympathy towards the Jewish people by the head of a state ever since the destruction of Jerusalem.

At the plenary assembly of the Jewish Agency (Zurich, August 12th, 1929) Einstein delivered a speech in which he referred to the peculiarity of Jewish nationalism.

When disturbances and hostilities on the part of the Arabs then broke out in Palestine, the Jewish communities, as every one knows, organized protest-demonstrations everywhere. Einstein took an active part in them; an especially deep impression was made by his letter to this effect, of August 31st, 1929.

Einstein's letters to the Arabian World in 1930, did not miss their mark. Those who take a closer interest, I refer to the book published in the English language, "About Zionism, Speeches and Letters by Professor Albert Einstein, Translated and Edited with an Introduction by Leon Simon, London, The Soncino Press, 1930."

In February 1930, the Einstein Forest was dedicated in Palestine.

In the summer of 1931, Einstein was invited to Oxford to hold lectures there. Various English newspapers published notices about him here and there.

But then an interview with Einstein of enormous length appeared in the "Sunday Express" on May 24th, 1931.

Already on account of its length the article seemed

questionable to me. I was particularly surprised at the introductory words of the interview: "Einstein, one of the world's great thinkers declares: I am a Jew and proud of it."

That reader who has read this chapter attentively, will already have perceived that Einstein's nationalism is not of an aggressive nature; it bears the character of a defensive, nothing more. The words ascribed to Einstein's great soul in the "Sunday Express": "I am proud of being a Jew" sound quite improbable. Einstein would say: "I am a Jew—and I am glad of it."

I was in London at that time and addressed a letter to Einstein at Oxford, mentioning this matter. I received an answer immediately, in which Einstein pronounced the letter a falsification. As Einstein's letter closed with the remark: "To be used as you feel inclined", I wanted to make this letter known to the public and composed the following article:

#### "ALBERT EINSTEIN AND THE DAILY PRESS."

In the Sunday Express of May 24th, 1931, there appeared a long article by Professor Albert Einstein. The reader racks his brains: Was it an interview with Einstein, where the correspondent was able to note down Einstein's train of thought in detail? Or has Einstein written such a long article expressly for the Sunday Express?

The reader is thus tempted to think that the great master of thought is in very close contact with the daily press.

Especially in the case before me, I feel it my duty to rectify the matter.

For this purpose I quote the second half of a letter from Einstein, which he sent to me from Oxford on May 26th, Albert Einstein writes: "Oxford, 26. 5. 31. Dear Mr. Reichinstein ...

"Now as concerns the article in the 'Sunday Express', I can only tell you that neither have I written an article, nor has one of the journalistic guild come near me. I have not even seen a single newspaper here. If, therefore, an article of the type indicated has been published, it is a falsification. Such things have already happened many times. I have long ago disposed of the newspapers by not reading them, particularly if they contain something pertaining to my person . . ."

Well, how did such a long article in the "Sunday Express" come about? Very simple! This interview represents an exact copy of the first chapters of Einstein's book "About Zionism," (London, The Soncino Press 1930.)

I applied to the "Times" with my article. It was flatly refused. I went to a second daily press. There the editor explained to me that no British daily would print my article. "We English—he said—have a proverb: A dog does not eat a dog. We cannot report about another paper having committed a falsification."

Fellow-feeling is thus rated higher than truth, and is preferred to truth.

On September 29th, 1931, I was talking to Einstein in Dahlem near Berlin. He brought up the subject of the "Sunday Express" again and called the "interview" a "falsification from A to Z". Concerning the words: "I am proud of it", he remarked that they were in opposition to his conception of the world. But when I would not give in and questioned him further, whether he would not perhaps utter these words at some occasion or other, Einstein finally said: "Only if I should be attacked." (2)

2) Of further interest are Einstein's letters about the relation between Jews and Arabs (Manchester Guardian, October 12th, 1929) as well as the letter in the Arabic newspaper in Palestine "Falastin" of January 28th 1930, where he starts from the combat against aggressive nationalism.

## CHAPTER VI.

# The Year 1933.

The whole civilized world was shaken by the terror which set in with Hitler's accession to the supreme power in Germany. The persecution of the representatives of the ideals of liberty and of the working classes, the persecutions of defenseless Jews, the exclusion of Jewish scholars, who had no small share in German culture, from the universities, the boycotting of Jewish shops, the public insults which were meted out to the defenseless Jewish minority, the promised burnings of books among which were many of high cultural value, which was put into effect on May 10th, altered the cultural aspect of Germany beyond all recognition. All over the world the moral indignation about the events in Germany increased day by day. In all countries these occurrences were discussed in large public gatherings, and the worthiest members of humanity searched for means of saving culture from destruction.

By a note to the Prussian Academy of Sciences, dated March 28th 1933, Einstein sent his resignation to the Academy with the motivation, that under the present government he could no longer serve the Prussian state.

In the full session of March 30th 1933, the Prussian Academy took cognizance of his resignation.

In the last days of March 1933, Einstein returned to Europe from America on the steamer "Belgenland". Already from board ship, Einstein sent a letter to the German embassy at Brussels in which he begged to be informed as to the steps he would have to take to renounce his Prussian

citizenship, which he had obtained through his appointment to the Prussian Academy of Sciences. In this letter, by the way, Einstein lays stress on the fact of his being a Swiss citizen.

At his arrival in Antwerp, the representatives of the municipal authorities as well as delegates from the universities of Brussels, Liege, Ghent, and Leydon were present.

On April 1st 1933 the Official Prussian Press Service published the following declaration by the Prussian Academy of Sciences (Neue Zeit, "New Times" of April 2nd 1933): "The Prussian Academy of Sciences has learned with indignation from the press notices about Albert Einstein's taking part in the spreading of horror propaganda in America and France. It has called him to account immediately. Meanwhile Einstein has sent in his resignation to the Prussian Academy of Sciences with the motivation that under the present government he could no longer serve the Prussian state. Being a Swiss citizen, he also seems to intend resigning the Prussian citizenship, which he only obtained through his admission to the Academy as a regular official member.

"The Prussian Academy of Sciences feels all the more pained by Einstein's demagogic activity abroad, as the Academy and its members have always felt very closely united with the Prussian state, and, with all the discretion due in political matters, has always guarded and emphasized the national idea. It has therefore no occasion to regret Einstein's resignation."

In reply to this declaration, Einstein addressed a letter to the Prussian Academy of Sciences which bore the designation "Le Coq near Ostende 5. 4. 33," The reply from the Prussian Academy of Sciences, was dated April 7th 1933. The following is however of interest. On April nth 1933, the Prussian Academy of Sciences sent Einstein's letter to the editorial office of the "Deutsche Allgemeine Zeitung"

(German General Newspaper) under the official number 75733, with a pertaining remark, and asked the paper to publish all of this.

I shall reproduce, below, the complete note of the Prussian Academy of Sciences, together with Einstein's letter.

"In connection with its declaration of April 1st 1933, the Prussian Academy of Sciences forwards the following communication by Mr. Albert Einstein:

Le Coq near Ostende

5. 4. 33.

To the Prussian Academy of Sciences:

"It has come to my notice from absolutely reliable quarters that the Academy of Sciences has spoken in an official declaration 'of Albert Einstein's taking part in the spreading of horror propaganda in America and France'..

"I declare herewith that I have never taken part in spreading tales of horror, and I must add that I have not *seen* anything of this kind of agitation anywhere. People were on the whole content with reproducing the official declarations and orders of the responsible German government officials, as well as the program concerning the annihilation of the German Jews by economic measures, and by commenting upon these happenings.

"The declarations which I have given to the Press refer to the resignation of my position at the Academy and the renunciation of my Prussian citizenship; I gave the reason that I did not want to live in a state where all individuals were not granted the same rights before the law, besides liberty of speech and doctrine.

"I further declared the situation in present-day Germany as a condition of psychic disease of the masses, and also made some remarks about the causes of this condition.

"In a note which I put at the disposal of the International **League** for the Opposition of anti-Semitism for purposes

of propaganda, and which was not meant for the press at all, I asked all level-headed humans who had remained faithful to the ideals of threatened civilization to stake everything they had in order that this mass-psychosis, which was manifesting itself in such a formidable manner in Germany, should be prevented from spreading any further.

"It would have been quite easy for the Academy to obtain possession of the correct text of my statements before expressing itself in the manner it has done.

"The German Press has reproduced my utterances distorted by a distinct tendency, as could not be expected otherwise considering the muzzling of the Press prevailing there at present.

"I assume full responsibility for every word I have published. On the other hand, I expect from the Academy that it will bring my statement to the attention of its members and of that part of the German public in the face of which I have been slandered, all the more since the Academy has taken an active part in this defamation of my character before the German public.

I remain respectfully yours,  
Albert Einstein.

"To this the Prussian Academy of Sciences remarks that its statement of April 1st 1933 is based not only on German reports, but for the most part on those of foreign, especially French and Belgian newspapers, which had not been challenged by Mr. Einstein; further, they had before them among other things, his literally wide-spread declaration to the League against anti-Semitism, in which he attacks Germany's reversion to the barbarism of former times. For the rest the Academy states that Mr. Einstein, who according to his own statement has not taken part in the spreading of horror propaganda, has on the other hand done nothing to oppose these insinuations and calumnies,

which from the point of view of the Academy he was in duty bound to do as an official member of many years standing. Mr. Einstein has on the contrary, and that abroad, expressed views which as the testimony of a world-famous man were sure to be made the most of and misused by those circles which are arraigned not only against the present German government, but also against the whole German people in aversion and hostility.

For the Prussian Academy of Sciences  
 H. von Ficker                      H. Heymann  
 Permanent Secretaries."

In the note of the Prussian Academy of Sciences to Einstein dated April 7th, the Academy emphasizes the fact that it had expected from him that, without regard to his own political views, he would have joined the ranks of those who have in this time defended the German people against the high tide of calumny. "How powerful an effect—writes the Presiding Secretary of the Prussian Academy of Sciences, von Ficker,—your testimony would have had abroad in these days of partly hideous, partly ridiculous calumnies!"

Einstein's answer is dated April 12th 1933. He replies that such a "testimony for the German people", as was expected from him, "would have been equivalent to a denial of all those views of justice and liberty which I have upheld all my life. Such a testimony would not have been, as you contend, a testimony for the German people; it could, on the contrary, only have worked out in favor of those who try to do away with those ideas and principles which have procured the German people a place of honor in the civilization of the world. By such a testimony under the present circumstances, I should have—if only in an indirect manner—contributed to the corruption of morals and annihilation of all cultural values ..."

In reply to a letter of the Bavarian Academy of Sciences (of April 21st 1933) Einstein voices his indignation at the fact that the German scientific societies had silently acquiesced to the fact that a not inconsiderable number of German scientists and students, and also of those active in the professions on the strength of their academic studies, had, in Germany, been robbed of their chances to work and to earn their living.

Here I cannot proceed without joining my own indignation to that of Einstein. This condition *in* consequence of which the German scientists block the way of progress together with the conservative elements and the intellectual proletariat, contrary to their duty of promoting and protecting scientific life, is of long duration: it prevailed already a good long time before Hitler succeeded to power.

What crime had the professor of theology, Dehn, committed, that in 1931 he was harassed and persecuted to such an extent by students, professors, and even by the church? It was his lecture in St. Ulric's at Magdeburg on November 6th 1928, about "the Church and Reconciliation between the Nations". There he said: "We should beware of doing anything on our part that could give war a romantic or even Christian aspect," Yet he had acknowledged the justification of a necessary war. "But—he said—I have preached peace as the true will of God. The natural consequence is: We must not glorify war." This was enough—even for the professors—to take a stand against him.

History will not forget how the Charlottenburg Technical University suffered in prestige before the public, when on February 24th 1932, the rector of the university, Professor Tiibben himself, led an uneducated man, i. e. the national-socialistic "expert", Gottfried Feder, to the chair in the new lecture room of the physical institute. In this lecture Jews and German representatives of culture were abused and slandered.

In the hunting down of Theodore Lessing, not only students, but also in a not inconsiderable degree even professors, took part. And when this martyr of science was murdered, the German universities found no word of condolence for their former member.

I cut short this sad page of the history of German science here. When in 1932, I informed Einstein of the obstacles that my German colleagues were putting in my way, and said how flimsy their objections were, he wrote to me on July 6th 1932: "About the professors I have no illusions."

Then Einstein's bank account and his house were confiscated and he himself slandered and treated as a leper by the German newspapers.

But already in the first half of the month of April 1933, the French Chamber of Deputies assented without debate and quite unanimously, to the institution of a special professorship for Einstein at the College de France. The impulse to the appointment emanated from the former Prime Minister, Painleve, who is himself a distinguished mathematician.

To bring the difference between Germany's conduct towards Einstein and the attitude of the rest of the world towards him into stronger relief, I here put down two reports of eye witnesses. The first report comes from R. Dupierreux (Brussels newspaper "Le Soir") and describes Einstein's first lecture in Brussels, shortly after his return from America. The reporter writes: "The whole world of science competes eagerly for his possession. The French Chamber of Deputies and the Senate have by a unanimous resolution created a new professorship for him. The Spanish government summons him, and America wants to make absolutely sure that the scientist will return to Princeton as usual, to continue his lectures there. Since Germany does not want to hear Einstein's voice any more, the rest

of the world listens all the more attentively. We are witnesses of an occurrence which is analogous to those of which the history of the Renaissance has given us more than one example, when by religious and political persecution the propagation of an idea was rather promoted than otherwise in the stirred up world.

About 500 people had assembled. It does Brussels great credit that so many people there are interested in relativity and mathematical physics . . . When he entered, he was obviously surprised at finding such a numerous audience. He came . . . attended by the rectors of the universities, and the gowns of the phalanx of scientific celebrities surrounding him, giving the whole matter an aspect of a magnificent retinue. Nevertheless no one is more simple than Einstein. He passes to and fro unaffectedly between the blackboard and the green curtain, and plays with his thoughts like a juggler with balls . . ."

I now proceed with the report which was published in the "Prager Tagblatt" and marked "E. M. S. London, End of July": "In the 'gallery for distinguished foreigners', already numerous kings and princes have followed the course of the parliamentary debates, those spirited speeches which demonstrate so impressively the dazzling display of fireworks of the English orators. Seldom, however, was there an unworldly scientist in the front row of the visitor's gallery like Professor Albert Einstein, the celebrated mathematician and creator of the theory of relativity . . . In his light green summer suit he looked younger, and from his eyes shone joy and satisfaction at the respectful appreciation shown to him and to his work at that moment from the speaker's bench of the House. Commander Locker-Lampson moved the immediate naturalization of Einstein . . ." Mr. E. M. S. reports further that Einstein's original refusal to come to Palestine and hold lectures at the university there had been misunderstood. Einstein

told the reporter that before his voyage to America in 1932 he had begun various new tasks of research which he could only finish and test with the help of excellent instruments. Therefore he stipulated that the physical institute in Tel Aviv should be perfected and newly equipped before he could start his activity there.

The description of the meeting of Einstein with H. G. Wells is interesting. The reporter writes: "The meeting of Einstein with H. G. Wells deepened the friendship between the two philosophers. Wells, the visionary, has the advantage over Einstein, of unlimited freedom in his sphere of work. He may prophesy and invent without the risk of posterity being able to accuse him of bluff. Einstein, however, admired him on account of his precision and his unprecedented plastic power of creation, which could build into the most distant future without becoming confused. After his conversation with Wells, Einstein declared that the poet with his thoughts soaring in the region of the planets, had led him into interesting paths and had drawn his attention to valuable conclusions."

Credit is due to the editor of the magazine "Wahrheit" ("Truth") for having organized an inquiry to notable Europeans about the events in Germany. Einstein declared: "I have often expressed my opinion, and do not think it advantageous to repeat the same over and over again. Only a courageous expounding of the cause of the threatened interests of German intellectual life by the German intellectuals themselves, could have an effect. The mistake which the German intellectuals have already made by sacrificing the Jewish brain-workers without offering resistance, will, however, scarcely be capable of repair. Repentance will here likewise come too late."

Romain Rolland wrote: "In view of the persecutions of the Jews in Germany, one does not know whether to brand the stupidity or rather the bestiality of the present

regime. For centuries the spectacle of a government craving to destroy a part of the intellectual and material riches of the country has not been seen. This branding has a particularly grotesque effect (if the case were not so exceedingly painful and tragic), as it is just the so-called nationalists who appear as the worst destroyers of their own nation. In these parvenus of power and culture there must exist a cruel ignorance, as they do not remember that the great Germans of the classical epoch—such as the aristocratic Lessing, whose memory should be sacred to them—have loved and esteemed eminent Jewish mentalities. Hitler's and Goring's brutal fists strike the author of "Nathan the Wise" in the face ... I cannot hold the German people responsible for the aberrations of its present, it is to be hoped short-lived, government. We further retain a brotherly attachment for the German people, while we wish that it may awaken and soon cleanse itself of this dishonorable nightmare.

"The brown pestilence has, quite from the beginning, surpassed the black pestilence. Hitler Fascism has achieved more unworthy brutalities in four weeks than its master and pattern, Italian Fascism in ten years. The burning of the Reichstag, which was to legitimize these deeds, is an act of rude police-provocation by which no one in Europe is duped.

"We expose these murderous attacks and lies before the opinion of the whole world: the entire public power in the grasp of a reactionary despotic party, every crime approved officially beforehand, every liberty of word and thought stifled, the unheard of political interference reaching clear into the academies, out of which those few authors and artists who retained their moral courage to an independent opinion were expelled, the arresting of men of high standing, not only of those belonging to the revolutionary parties, but also out of the socialistic circles

and those of the middle class liberals, the actual proclaiming of exceptional law in all Germany, the suppression of the most elementary liberties and rights, whereon the entire civilization is based.

"We appeal to all authors, all spokesmen of public opinion, to all those in Europe and America, who without regard to party membership have a feeling for the unworthy challenge to human dignity; let them join our protest and keep in mind the solidarity that unites us with all those who fight against the unloosed terrorism of an unscrupulous and unfettered reaction!"

In the same sense Andre Gide, Josiah C. Wedgewood, Eugen Relgis (Bucharest), Eloy Muniz (Barcelona), and several American and English representatives of culture have expressed themselves.

The "Committee for Admittance and Support of the Victims of German anti-Semitism", which is under the chairmanship of the former Prime Minister Painleve, published the following appeal in April 1933: "The representatives of French intellect feel apart from every political consideration—most deeply alarmed by the revival of barbarism in the form of the anti-Semitism at present raging in Germany. They protest in the name of humanity and of culture. They express their indignation at the criminal acts of violence against a denominational minority. They deplore the fact that German culture, which has presented the world with so many geniuses and took pride in the height which it had attained, now shows feebleness and impotence in the very moment where political passion commits the worst outrages against the Jews, who have contributed essentially to the progress of humanity. They are afraid that the difficult efforts to bring about peace, which are followed with anxiety by humanity, will be endangered by these new acts of violence against justice."

The manifesto is signed by the most notable represent-

atives of French intellectual life, among whom are many university professors and scholars of world renown.

A great impression was made on the whole civilized world by the attitude of the former conservative Foreign Minister, Sir Austin Chamberlain, in the English House of Commons at the debate on foreign politics on July 5th 1933. Already at an earlier period, i. e. on April 14th, he had voiced the indignation of the entire English populace about the Hitler regime. Now he repeated in even harsher words his accusations against the regime which threatened civilization and peace.

The Foreign Minister, John Simon, stated at this debate that it was really a declaration of resistance of the entire British people, hurt in its principles of toleration by these occurrences. "In our country—the minister concluded—public opinion was by no means blind during the last years to the demands of the great German people and to a sympathetic contemplation of its situation after the war. The tragedy lies in the fact that the present events have contributed much to lessen the sympathy for Germany."

Still in April 1933, R. M. Coudenhove-Kalergi wrote: "A barbarous time has set in. The situation of the minority is the measure of the chivalry prevailing. For humans and communities with whom power ranks higher than chivalry, minorities are without rights because they are without defense. This is the innermost meaning of the European question of the minorities. Here we have the barometer of European culture ... The oppression and persecution of the Jews is a tragic chapter of the minority question. For it is here not the question of a culturally inferior part of the people, which should adapt itself to a higher culture, but of one of the most valuable branches of humanity. To this branch humanity owes not only the founder of Christianity and all his Apostles, but at the same time numberless talents, noble characters, and some of its

greatest geniuses. Nevertheless the Jews have been persecuted for thousands of years; first on account of their religion, today on account of their race. In truth on account of their having been defenseless for nearly two thousand years, on account of their being a minority everywhere, dependent on the chivalry, lack of prejudice, and the justice of the people who are in the majority. So in times of pestilence and famine, of lost wars and revolutions, they have always been the lightning-rod for the rage of the mob. So today in the time of the catastrophe of economic crisis and unemployment, they are again singled out as the victims of fanatical hatred and untenable prejudice."

On June 1st 1933, Romain Rolland's appeal to the youth of Europe appeared. "Fascism—it says in this appeal—has many masks. It adapts itself to the character of every people. Here it is martial or clerical, there it is capitalistic or democratic; it even is capable of imitating socialism in a distorted manner and its bacillus achieves development in every culture or want of culture. Whatever its mask may be, it always has the same basis; it is nationalism; it subordinates everything to the nation and the dictatorial state which it identifies with the nation, to absorb and suppress it.

"We say: Nationalism is the enemy! This should be your battle cry! This enemy we have not only to fight outside ourselves, we must also exterminate it in our hearts . . . We must form an International of all nations, which will carry on the battle for liberty against oppression. We do not fight for a single people, not for our people. If we are defenders and protectors of the Soviet-Union, it is because it is not a nation, not Russia, but the union of all socialistic Soviet-republics of the world, that of today, that of tomorrow and that of all those that want to join it. Love for ourselves and for our own people is a quite natural

feeling that must develop and subordinate itself to the love of human society."

Einstein wrote on the subject of this: "Former generations could believe that intellectual and civilizing progress was nothing else for them but the inherited fruits of work done by their forefathers, which made possible an easier and better life.

The heavy troubles of our time, however, show that this has been a disastrous illusion.

We see that the greatest efforts must be made so that this inheritance may turn out not a curse, but a blessing to humanity. If formerly a man was already socially valuable, if he freed himself from personal egoism to some extent, today we must demand from him a victory over national and class-egoism as well ..."

The burning of the Reichstag, with the unmotivated blaming of the German and Bulgarian communists for having caused the fire, has, in an unprecedented manner, caused the representatives of the intellectual world of all countries to organize themselves in battle against the reaction in Germany. An international committee of inquiry was formed, of which renowned lawyers of the following countries are members: Great-Britain, United States, Belgium, Denmark, Spain, France, Holland, Sweden and Switzerland.

To the request of the Chief Solicitor for the State (Oberreichsanwalt) Werner, in Leipzig, to hand over to him the promised material of the international committee, Rornain Rolland (in August 1933) replied at length: "The documents—he wrote—which are in the hands of this committee and which prove that Torgler as well as the three Bulgarians, Dimitroff, Popoff and Taneff are innocent, will be put at the disposal of the Supreme Court of Justice (Reichsgericht) and the witnesses will be named, as soon as the absolute guarantee for a free and independent defense is given."

The committee of inquiry demanded certain guarantees, such as, for instance, free choice of counsels for the defendants, admission of the foreign counsels chosen by the accused, authorization of the defense to inspect the briefs, safe conduct and full security during and after the legal proceedings for the counsels and the witnesses demanded by them, or by the international committee of inquiry etc. etc.

In Berlin no readiness to grant these conditions was shown.

And then these unlucky proceedings in Leipzig, with the soldierly appearance of the National-Socialistic leaders as witnesses in court were dragged out, these unlucky proceedings which did so much to harm Germany's prestige abroad, in spite of the fact that the President of the Tribunal, Biinger, who had formerly been Minister of Justice in Saxony, tried so hard to save Germany's prestige.

I know Biinger personally. When he was Solicitor for the State (Reichsanwalt), at the court of the Reich (Reichsgericht), and later when he was vice president of the Saxon diet (Landtag), he was my guest in Leipzig several times. At that time this very cultured lawyer fully and wholly conveyed the impression of a representative of culture, the impression of a man to whom the most important thing was the promotion and protection of the interests of progress and culture. But now he becomes more and more a politician and the representative of culture recedes more and more into the background. At a judicial murder (the case of Jakubowsky) we already recognize by his statements, that he represents not so much justice, as the prestige of Germany. Now Biinger started this trial for arson in Leipzig with an appeal to "German justice". The inquisitive asked: Why does justice need the attribute, "German"?

On another occasion, the National-Socialists unabashedly defined justice as "what is good for Germany." **And**

if in former years German philosophy coined the sentence: *pereat mundus, fiat justitia* (let there be justice though the world perish), the German Nationalism now constructed the sentence: "*pereant mundus et justitia, fiat Germania* (let there be Germany though the world and justice perish)".

The acquittal of Torgler and the Bulgarians might suggest the idea that it was justice which carried the day after all. But the public opinion of Western Europe had other views. I quote the opinion of a not too liberal paper: "Has justice been victorious? In a country where such proceedings were possible there exists no justice, and if this verdict is a victory, it is a victory of the world's public opinion, a victory of Dimitroff, whose magnificent defense brought about the collapse of the charge, a collapse which could not be followed by anything but an acquittal. But this acquittal is at the same time the condemnation of the rulers of the 'Dritte Reich.'"

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In the first half of the month of September 1933, the German broadcasting stations and the German dailies again vied with one another in insults directed against Einstein. One daily paper used the title, "Einstein's Newest Infamy," in big letter underlined with red printing ink.

What was it that was again disturbing the German mob? A Belgian anti-militarist had asked Einstein's opinion about the refusal of military service. Following this, Einstein's answer appeared in the "Temps". Einstein wrote: "Some time ago one could still hope to combat militarism successfully by an individual refusal of military service. But today there is a state in the middle of Europe, which openly makes preparations for war. Under these circumstances other countries, especially France and Belgium, are in great danger and can only rely on their own preparations. As

regards Belgium, it is obvious that it will not misuse its military preparations, which it absolutely needs for the protection of its existence. Imagine Belgium occupied by present day Germany. This would, without doubt, be much worse than in 1914, although the occupation was, at that time, already terrible enough. Therefore I tell you point-blank: If I were a Belgian, I would not refuse military service under the present circumstances, but would render it with a good conscience and with full confidence of contributing in this way to the salvation of European civilization. This does not mean that I renounce my former views. I only wish to see once more the coming of a time when refusal of military service can be regarded as an effective means of progress."

The paper "Temps" reports that after a sea-voyage which Einstein undertakes on an English yacht, he will withdraw to some more remote and unexposed castle in France or England. For the time being he is under the protection of the Belgian government.

We have seen above, that Einstein speaks not only of a direct effect of natural science on the conception of the world, but also of an indirect one. Here we have a case where the temporal epoch determines the conception of the world. It is of importance that such an influence on the conception of the world on the part of the temporal epoch can be ascertained not only with Einstein, but also with other ideologists of humaneness. So quite lately ("Prager Tagblatt", May 15th 1934), <sup>the</sup> president of the pan-European Union, Coudenhove-Kalergi, on the occasion of the pan-European economic conference then in preparation, declared that today a political pan-Europe was just as little possible as pacifism, for which reason we had to limit ourselves to an economic union.

The sense in pacifism, however, and the refusal of military service, consists not only in the protection of the interests

of the mass, but also in the hallowing of the individual, whose freedom and existence (besides justice) constitute the highest instances of moral law. Our present epoch therefore overthrows this view; at the same time — as we shall see below — our present epoch may be characterized by such mass-movements as Bolshevism, Fascism, National Socialism, group-religion etc., where the role of the individual recedes into the background, and it is the mass that dictates its will. Today it is not the individual, but the mass that is hallowed.

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At the end of September 1933, Einstein's message to humanity appeared, ("Wahrheit", 'Truth', Sept. 30th 1933):

"Striving after knowledge for its own end, love for justice bordering on fanaticism, and striving after personal independence — these are the incentives of the Jewish people's tradition, which make me regard my belonging to them as a gift from fate.

"Those who today work against the ideals of reason and of individual freedom, and want to enforce soulless slavery to the state by means of brutal despotism justly see us as their implacable adversaries. History has imposed a difficult struggle on us, but as long as we remain devoted servants of truth, justice and liberty, we shall not only continue as the oldest of living peoples, but, as up to the present day produce, values by productive work, which contribute to the ennoblement of humanity. A. Einstein."

On the 3rd of October 1933, Einstein held a lecture in the great lecture hall of the Albert Hall in London on a general, politically opportune subject: "The Preservation of Human Civilization". The lecture, which was held for the benefit of the German emigrants, represented a political event of great importance. Lord Rutherford had the chair and it is of interest that after the lecture, Sir Austin Chamberlain

addressed the audience and declared that by his presence at Einstein's side, he wanted to express the sympathies of the British nation with all those who had been driven out of Germany by the Hitler regime.

As the London police administration had received a letter which spoke of the threatening of Einstein by an anti-Semitic fighting-organization, the guard in the lecture-hall had to be increased during the lecture.

Einstein treated the following question in his lecture: How can humanity and how can the intellectual possessions of civilization be protected from destruction? He appealed to the statemen and demanded, besides the preservation of peace, also a change in education.

On October 7th 1933, Einstein was already on his return journey to America.

The theme of his lecture of October 3rd treats the identical subject on which the work of the Geneva Organization of Intellectual Co-operation is based. Questions of supernational and education importance are treated. The "Intellectual Co-operation Organization" at the League of Nations in Geneva generally assembles twice a year. To make their work more effective, the French government resolved to create and maintain a continually working "International Institute of Intellectual Co-operation" having its seat in Paris.

To this institute fell the task of instigating correspondence between personalities who were leaders in the intellectual sphere, so that questions useful in a high degree to mutual intellectual interests and to the League of Nations, might be discussed. Up to now this institute has published two volumes of correspondences. The first volume is entitled: "Pour une Soci6t6 des Esprits" ("For an Association of Intellects"). In the second volume, (Paris 1933), Einstein and Sigmund Freud treat the problems of protecting humanity and civilization from wars.

Einstein wrote to Freud (Caputh near Potsdam, July 30th 1932) that he was happy to have an opportunity to discuss a freely chosen problem in an unhampered interchange of views with a person of his own choice, in consequence of this impulse coming from the League of Nations and its Paris institute. Among other things, Einstein raises the question: How is it possible that the incidentally ruling governmental group can subject the mass of the people to its desires, when a war brings about only suffering and loss for the mass? Einstein believes the answer nearest to truth to be the following: The minority of the incidentally ruling party has first and foremost, the school, the press, and generally also the religious organizations, in its hands. By these means it governs and guides the feelings of the great mass and makes them its tool, with no will of its own. But even this answer does not seem to him to exhaust the connection, for the question still arises: How is it possible that the mass suffers itself to be thus goaded into rage and self-sacrifice? Einstein thinks he can find the answer in the following: There is a need in man to hate and to destroy. While in ordinary times this tendency is in a latent condition, it comes to light in abnormal ones; Einstein thinks, however, that it is, comparatively speaking, easy to awaken it and to raise it to a mass-psychosis. Here, it seems to him, lies the deepest problem of this disastrous complex of effects. And Einstein thinks that only a great expert in human instincts can shed a light on this field. He therefore appeals to Sigmund Freud; and the latter replies in detail from the standpoint of his sphere of work.

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To engage more deeply in the study of the development of Einstein's political aspect of the world, we must first answer the question: What is the character of our present epoch of time?

While, as regards economics, it is characterized by a

crisis and unemployment, from the political party standpoint we can ascertain the increase of Bolshevism and Fascism, both at the expense of social-democracy, which, in all countries, is undergoing a severe crisis.

Social-democracy has arisen out of scientific socialism. It was not able, not even when in authority, to start off the socialization of the economic system. According to its scientific theory "Historical Materialism", it had to allow social economy to ripen. Its theory for the present has reserved a passive role for it and it could not but limit itself, for the present, to the so-called Minimum-Program, such as organization of the labor movement, reduction of the working-hours, enlightenment of the working classes, etc. etc. .

This enlightenment constitutes the reason of its influence. It pronounced an accusation against social injustice. And its progress was a very eloquent accusation.

Let us remind ourselves how Karl Marx describes the situation of the working classes, more correctly, their everlasting exploitation by capital; let us remember Lasalle's "Ehernes Lohngesetz" ("Unalterable Law of Wages") etc., etc. .

This enlightenment disclosed the grossly material, capitalistic character of war. It reproached the capitalistic system of the world with its prostitution. The political speeches of Bebel had a stirring effect, not only on the workmen, but also on every man of education. Social-democracy emphasized the fact that the worker has nothing of the only asset of the capitalistic system of the world, art and science, that he hardly even comes into contact with it. My friend, Alexander Lipschutz, one of the most distinguished living physiologists, now professor in Chile, who had been a vagabond social-democrat in his youth, at that time wrote for a German social-democrat periodical a treatise having the motto "J'accuse" and the title "Statistics on

the German Labourer, Statistics of Misery". He says there, among other things: 'Thou great people of poets and thinkers! Eighty pfennig per week is the amount a workman's family can spend on the gratification of its cultural needs, such as newspapers, books, theaters, concerts, correspondence, etc.!"

This indictment against social injustice, and with this indictment—mentioned by way of parenthesis—present day National-Socialism has nothing to do, Bolshevism has strengthened still further. In 1918, at the beginning of the Bolshevistic revolution, the erstwhile Bolshevik Minister of Education, the Public Commissioner Lunatscharski, invited the representatives of all the Russian universities to Moscow, for a discussion about the attitude to the new political situation. I took part in this meeting as the representative of the University of Nishni-Novgorod. Lunatscharski expressed his opinion approximately as follows: "What do science and culture, by which they have scarcely ever profited and about which they know hardly anything, signify for the mass of the people! You professors ought to be glad, that in this time of social explosion among the mass of the people such educated leaders as we are have appeared with the power of enlightening and restraining the mass, without which the people, famished for bread and knowledge, would destroy you as well as your science!"

Meanwhile the passivity of the social-democrats already intimated above increased. They became more and more middle-class. In the Great War they subordinated themselves to the nationalistic tendencies prevailing at the time. And even more! The history of this political movement shows that, as soon as a social-democrat is summoned to a middle-class cabinet, he often turns his back on his party. This turning renegade has deep roots, on the one side, in the psychology of scientific socialism and, on the other side, in the economic character of our epoch. We shall see below,

that nowadays even the great democratic governments of Europe have to abandon their position based on principles.

Now what is Bolshevism? Theoretical Bolshevism arose about 1903, when the Russian Social-Democrat party, which at that time still led a subterranean existence, had split into two directions.

While orthodox Marxism taught that socialization of the economic system represented, so to speak, a deterministically necessary proceeding, but that this process could neither be retarded nor speeded up, the leaders of Bolshevism believed that the socialization of the economic system or the execution of the Maximum-Program could be carried out forcibly in a revolutionary manner—as they do now with the Five-Year-Plans. While daily experience shows that a finely differentiated industry cannot be inoculated into a country, and that it took generations until the Swiss watch industry, for instance, had reached its high level, the Bolsheviks, in opposition to the historical materialism of Marx and Engels want to carry out socialization of the economic system, introduction of new industries, and conversion of the country into an industrial country, at their command, in a short time.

And we must confess that to a certain degree they are succeeding. In a relatively short time, large factory complexes are erected. The Bolsheviks develop great abilities for organization. The country is changing into an industrial country.

In their interior policy they have broken with the democratic principles of humaneness and liberalism. For—they say to themselves—the representatives of these ideals were for the greater part Social Democrats and these have failed and ignominiously capitulated before the machinations of the capitalistic world war.

Let us examine the state of feeling of an idealistically

minded Bolshevik at the end of the Great War, a Bolshevik who was not yet influenced by concrete politics and diplomacy, as up to then he had been an outsider. It suffices to enter into the feeling of an idealist who was far removed from European politics with its war. I quote the view of Mahatma Ghandi: "The last war has proved, more distinctly than ever before, the satanic nature of the civilization by which Europe suffers itself to be governed today. Every ethical law has been broken by the victors in the name of justice. No lie was too vile to be used. The motive of these crimes is by no means of a religious or intellectual nature. It is grossly material. Today, Europe is Christian only in name. In reality it worships Mammon."

Coudenhove-Kalergi sees the principal fault of the catastrophes which Europe has left behind and which still threaten it, in the unscrupulousness of the European class of leaders and concludes: Nowhere were the people responsible for the outbreak of the war, but only their rulers or ministers. A bare two dozen people have thus plunged Europe into the Great War.

And it is no wonder that this terrible misfortune which afflicted humanity has produced a crisis in the authority of all governments, as well as in that of the liberal leaders of the mass.

Bolshevism distrusts the liberals and the social-democrats, and everywhere suspects renegades in the favor of nationalistically affected capitalism.

The masses, exhausted by the Great War and privations, follow it blindly. And so it came about that after the Great War the political theory laid down in 1903 proved itself more capable of surviving in Russia than other socialistic theories, and together with this new theory there entered into Russia—as the middle-class press expressed itself—a loss of personal freedom, renunciation of the ideals of humaneness, etc. We reply: But this is rebellion against

civilization. In America, where personal liberty, freedom of trade, and ideals of humaneness are especially valued, people were filled with indignation. They try to regard Soviet-Russian Bolshevism, Italian Fascism, and German National-Socialism, from a single point of view and to reject all three of them offhand.

In July 1933 an interview of the American journalist, Edgar Mowrer, with President T. G. Masaryk appeared in the "Chicago Daily News". Masaryk defines democracy as a condition where human beings do not consider one another as a means of personal profit. Every man, every woman, every child, is acknowledged as something mentally valuable. Masaryk believes democracy to be the highest ideal of the political organization of society and at the same time the ideal of humaneness. To this the journalist replied: "But for the new rulers such an ideal is an occasion for ridicule or contempt. Even if they declare themselves idealists, they always attempt to subordinate human beings not only to their hankering after power, but also to a patriotism which justifies war, social injustice, intolerance and tyranny as necessities for the general welfare."

Already from these words the reader will recognize that we must distinguish between three forms of government mentioned here.

As concerns the ideals of humaneness we saw above that Einstein, as well as Coudenhove-Kalergi, declared it impossible to realize pacifism today. Einstein's demand that the great powers should interfere in the relations between Japan and China and should put a stop to the aims of conquest the Japanese (See chapter III) is also unfeasible, and this not only for the reason that every country is seeking its own grossly material advantages, but also for the reason that such an interference could start a world-catastrophe. The governments endeavour to maintain the "equilibrium of peace". The events in Austria which bruised every de-

mocratic sentiment had to be watched inactively by the democratic governments. For the very reason of the maintenance of this "equilibrium of peace"!

Even more! The reader has seen above what a protest the English House of Commons had raised against the Hitler government. Meanwhile however, English politics have changed in favor of the Hitler government, and already in December 1933 a protest against the International Committee of Enquiry concerning the burning of the Reichstag was raised in the House of Commons by the above-mentioned former Foreign Minister, Sir Austin Chamberlain. German diplomacy appealed against the support of the German emigrants by democratic governments as well as against the circulation of the "Braunbuch" (Brown Book) outside Germany. And the demands of the Hitler government are being partially complied with.

As a Swiss citizen, I made a protest to the Swiss government against the confiscation of a parcel containing the first edition of this Einstein book (of the year 1932) on the part of the present day German government. And the answer of the Swiss charge d'affaires read, that the confiscation of this book was sufficiently motivated by the police law of the country, and therefore justified. While before the war Switzerland gave refuge to the revolutionaries and even anarchists of all countries and treated such questions from the point of view of the democratic principles of liberty, nowadays it is content with a reference to the police law. It is, of course, no ill will on the part of the Swiss government, but the present epoch of time which is responsible for it.

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As the ideals of humaneness, especially of pacifism are mentioned here again and again, I should like to insert a few words about the genealogy of the ideals of humaneness. Who are the harbingers that have spoken of these ideal: ?

The poet, Count Leo Tolstoy, who as an old man hurled a note of indictment at the Czaristi regime with the title "I Cannot Keep Silence", derives his pacifism from his doctrine of non-resistance to evil. Tolstoy proceeds from Christianity (3). Gandhi, who in his "Non-violence" has recognized a method for political battle, proceeded from "Ahimsa". This is a religious doctrine of the Jainas, a sect of Hinduism, and means: Not to do evil! Gandhi's parents belonged to this sect. Ahimsa is traced back to the founders of religions, Mahavira and Buddha. But Gandhi confesses that he owes to the New Testament, especially to the Lord's Sermon on the Mount, the revelation of passive resistance. The Indian books of religion (Bhagavad-Gita) strengthened the impression and Tolstoy's book "The Kingdom of God is Inside You" gave him a lasting form (See Romain Rolland: "Mahatma Gandhi"). Gandhi was in correspondence with Tolstoy. And it is an irony of fate that the Christian Church has anathemized Tolstoy, to whom the esteem in which Christianity is held in India, is due.

It is of interest that Gandhi's "Heroic Passivity" in the form of "Non-Participation" (Refusal of Public Service) and "Non-Co-operation" (Refusal of Co-operation) has actually been victorious in South Africa after twenty year's work of self-sacrifice!

Of importance is Romain Rolland's interpretation that Gandhi's inner nature possesses, so to speak, two floors: religion as the stronger basis, and the social activity which he erects on this invisible basis, adapting it to the momen-

3) In a letter to Sigmund Freud, Einstein says that all those who were valued beyond their time and beyond their nation as leaders in the intellectual and moral sphere, acknowledged their great longing to save humanity from war. "There unity rules from Jesus Christ to Goethe and Kant." From the bibliographical standpoint I must also mention that this letter from Einstein which is contained undated in the book "Mein Weltbild" (My Picture of the World) seems to be an answer to the abovementioned letter of Sigmund Freud.

tary possibilities and desires of the country. He is religious by nature ,political by necessity.

This political necessity is even more strongly expressed in a conversation between T. G. Masaryk, who by many is justly called the greatest living democrat, and Tolstoy. Masaryk said: (I quote from memory and am therefore only exact as far as the meaning is concerned.) "Am I to sit in my study and wait till some barbarian attacks me? Of course I must arm myself!"

Summing up, we may state that the intellectual leaders of our time such as Einstein, Romain Rolland, Ghandi, Masaryk, H. G. Wells, Coudenhove-Kalergi, Bernard Shaw, and many others, regard the ideals of humaneness, which are derived from the great founders of religions and teachers of humanity, as sign-posts of politics; but most of them, as for instance Einstein, Masaryk, Coudenhove-Kalergi, and others, as realistic politicians, (Realpolitiker) make concessions that are not only in a similar relation to the chief ideals as the Minimum Program is to the Maximum Program of classical Marxism, but which are even partly in opposition to these chief ideals.

Let us now again study the emotional condition of the Bolshevik shortly after the Great War, which, mentioned by the way, represents the "conditio sine quanon" [essential condition) of the investigation of the epoch.

The Bolshevik denies the ideals of humaneness, as they have nothing to do with concrete reality. He has reproached Tolstoy because, in spite of his enormous moral authority, he has done nothing to relieve the fate of those suffering beneath the Czar's knout. This was due to Tolstoy's unconnectedness with any active battle-organization. For the Bolshevik the ideals of humaneness are only a phantasy devoid of all reality, only a poetical illusion. And indeed—it cannot be denied—the Bolsheviks, in 1918, regarded the ideals of humaneness from the same stand-

point as that from which three years later, the fighting Ghandi, united with the mass, parried the manifesto "Appeal of Truth" by Rabindranath Tagore. In Ghandi's heroic passivity, in his demand for complete severance from European civilization, Tagore discerned intellectual despotism and urges co-operation with the whole cultural world. "The bird —it says among other things in Tagore's manifesto—which has been awakened by the dawn of the morning, does not let itself be governed by the worry about food. Its wings untiringly respond to the call of the heavens. Its throat pours forth songs of joy about the new light. We are called by the new humanity."

Ghandi's answer is "Sileat poeta". The poet should be silent if the country is in danger. Literally, Ghandi's answer runs as follows: "Tagore talks of patience and appeases his hunger with fine songs. We are at war. Let the poet lay aside his harp. Afterwards he may sing again. If a house is on fire, every man takes up a bucket to quench the conflagration ..."

And how does the Bolshevist experience the so-called "national rising" of National-Socialism? For this purpose I cite the communistic "Braunbuch". In the prefaces of the authors and the editor the fact is emphasized that it is a German book, that Germans have experienced and endured, that Germans have written it. And further: "It is an international book, anti-Fascists in England and France, in Holland and America have assisted the publication of this book. The World-Committee for the Victims of Hitler-Fascism, at the head of which are Professor Einstein and Lord Marley, has helped with this book."

I shall continue here with a description of the flogging-cellar: "From the cross-examination the prisoners are taken down into the cellars. The ill-fated ones are tottering already. It is a sinister experience to be all alone among

murderes. Sinister for every one is the knowledge that this house of torture stands in a modern metropolis, that millions of people lie quietly asleep in their beds, unconcerned as to the infamous deeds that are enacted night after night in the name of the government . . . And again everything appears haunted: these are the days when Hitler delivers his inaugural speech in the Garnisonskirche (garrison church) in Potsdam at the tomb of Frederic the Great. Everywhere the church-bells are ringing, hundreds of thousands are thronging the streets. Enthusiasm is seething, the rising, the regeneration of the nation is talked of everywhere. The prisoner has also heard the phrases and it comes home to him now, before this scourge, how monstrous this lie is.

The political state act in Potsdam becomes symbolic: There, before generals and the descendants of the Hohenzollern, the "Führer" (leader) speaks at the tomb of the prince with the crutchstick—here the S.A. guard flogs and tortures defenseless workmen in the noise-tight cellardungeons. And there is only the one symbolic difference that now, in 1933, the German steel industry has provided the tools for their own hangmen . . ."

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Now the persecution of the Church on the part of the Bolshevistic regime begins in Russia. The Pope and the archbishops hurl their indictments against Russia. It stands to reason that the head of the Russian church, Mitropolit Sergius, refused the papal offers of moral support and material help.

But the manner in which the correspondent of the "Vossische Zeitung", W. Stein, describes the state of affairs is very characteristic of the new attitude towards Bolshevism in Western Europe: "By formal law—says Stein—the Soviet government is right, as is the Mitropolit Sergius, in rejecting the assertion of persecution of religion by

the state as incorrect. The stress is here, to be sure, put on "formal" and the "state". The Soviet state leaves the church alone; it does nothing for it, but it does not forbid it, it does not persecute it."

The state of affairs is in fact as follows: As before, there are ritual burials, weddings, and church services. The priests are neither persecuted nor banished for serving the church. The state has simply made the existence of the church more difficult in withdrawing all subsidies and expropriating it. The state has taken away the authority of the priests, and degraded them to "second-class citizens" as it did with the tradesmen. If the priests are "anti-revolutionary" they are persecuted and arrested.

The attendance at church of adults is not forbidden, but the state has taken away from the church the religious education of youth. In Russia it appears that the real battle against the Church is not led by the state, but by the "Bund kampfender Gottloser" (Union of Fighting Atheists). It must, however, be emphasized that this union does not only represent "public opinion" but that in fact it has the government on its side.

If, for instance, this union proposes the prohibition of bell-ringing, the dismounting of bells, the closing of a church, the government carries this proposition out after it has safely passed the high court of "public opinion".

It is scarcely noticeable that the "nervus rerum" here is not the Union of Fighting Atheists, but the Bolshevik state.

To the attacks of the Pope and the archbishops, the Bolshevik newspapers have replied in words not at all diplomatic, compared with which the utterances of Dante about the Pope, the Vatican, and the princes of the Church, are only a harmless joke.

However this may be, the attitude of the Russians towards the church has met with the approval of many

intellectuals in Western Europe; this approval assumed solid shape when the Russian astronomers sent the Pope an open letter written in an objective tenor. To remain objective myself, I shall not reproduce the contents of the letter in my own words, but shall quote these contents from the newspaper "Welt am Abend" ("World in the Evening") of April 17th 1930.

The Russian astronomers object to the quite incorrect assertions in the epistle of Pius XI, which states that in the Soviet-Union the individual fields of science are in a sad plight. They further enter into the relation between the Church and the great epochs of natural sciences. They point out the fact that the great geniuses in the history of science, such as Giordano Bruno, Galilei, Copernicus, Tycho Brahe, and Kepler were designated as heretics by the Church tortured and executed. According to the newest researches, the trial of inquisition against Galilei could not have taken place without gross falsifications. The astronomers asked the Pope to open at last the secret archives of the Vatican about the inquisition, and to put them at the disposal of scientific research. By this an immense service would be rendered to the history of astronomic research.

The manifesto is signed by twenty-one of the best known Russian astronomers.

Now we gradually begin to understand how it was that Lunatscharski achieved such a great success with his lecture on Nov. 3rd in the Berlin Singakademie (Singing-Academy) about "Fourteen Years of Cultural Building-up in the Soviet-Union". And it was here not only a question of success with the audience of the densely crowded hall which consisted of intellectuals, authors, physicians, teachers and technical experts, but with the entire public.

The newspaper "Tempo", "Berliner Tagblatt", "Vossische Zeitung", and others, in their issues of November 4th 1931, brought more in favor of the lecture than its dry

reproduction alone. It cannot be denied I Bolshevism is beginning to win over the "public opinion" of Western Europe.

Lunatscharski (See "Berliner Tagblatt") first quotes Einstein: "In the East the most powerful experiment of our times is being executed\*", and then Shaw: "In the East the day of a new era has dawned."

The same "Vossische Zeitung" which a short time ago (October 8th 1931) was so indignant about the conversion of Pastro Eckert to Communism, now finds not a single word of objection concerning the contents of the lecture. Although this newspaper mentions the fact that Lunatscharski now occupies the office of President of the Scientific Council of the Soviet-Union, no mention whatever is made of the circumstances regarding his falling into disgrace with Stalin, who dismissed the former Minister of Education from his post of many years duration.

Many a newspaper emphasized how non-maliciously convincing was the manner in which Lunatscharski developed the new principles: it was not true that people had no interest in general theoretical problems and always pursued grossly material expediency alone, it was not true that art was under the knout of the state's interests, it was not true that the entire production was regarded from the point of view of immediate consumption. The fight against equalization and dull blotting out of individualism had already been taken up. The new principles of life do not allow our having to wait for the joy of living until victory has been achieved, on the contrary we should also provide for it during the time of building-up.

Anatolii Lunatscharski (at the end of 1933) was one of the most highly educated literary men of Soviet Russia. I made his acquaintance in Kiew in 1905. At that time, besides his activity as a revolutionary, he was also occupied with

positivistic philosophy. Later however, as Soviet-Russian Public Commissioner for Education, he tried to reconcile religion with Bolshevism, for which reason Plechanow and Lenin called him "Saint Anatol". This was also the reason for his falling into disgrace with Stalin and having to resign his office as Minister of Education; in 1929 he occupied a subordinate position only, after which he passed into the diplomatic service and finally became Ambassador in Madrid.

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The Russian socialists concerned themselves with positivistic philosophy to a great extent. At present also, the leading intellectuals of Soviet Russia are partisans of modern empirical philosophy. And it may seem as if Bolshevism denied the old religions for the same reason as it was done by representatives of the above mentioned philosophic direction, for instance by Carnap, whose acquaintance the reader will make in the last chapter of this book.

It is the task of the philosophy of our time to prove that this is not the case, that in other words, Bolshevism has its own inner reasons for denying the former religions and that sometimes these reasons do not at all coincide with those of empirical philosophy.

Carnap categorically rejects all religions and metaphysics. For Carnap only such statements have a meaning from which results may be drawn, which can be tested by experience, i. e. allow themselves to be proved "true" or "false".

Now however, as we shall see in the last chapter, science cannot exist without the element of the "unproved", without faith. The scientist, for a long time, sometimes during his whole life, (and not unproductively by far), concerns himself with hypotheses and theories which depend on

faith. (4) If therefore Carnap says that metaphysics with its conception of the absolute, transcendental, ontologic problems of the world, is "opium for the educated" as religion is "opium for the people", he casts away the good with the bad!

On the other hand, however, Bolshevism does not deny faith. A politician of discernment is one whose first demand it is not to come into opposition to a cosmic law that is not yet recognized, and he believes to have recognized such a law and to be able to guide the masses in its current.

The educated Bolshevik believes that he is by no means in opposition to historical materialism. He believes he is leading the masses in the direction of the historical law.

And on this way he rejects everything that seems disturbing to him.

The ruling religions are pillars of the old cosmic order, not only the "divine right" of emperors and kings is based on them, but through them also the capitalistic order of the world is hallowed. In history, religions were obstacles, they even were a direct hindrance to the evolution of science. (The reader will find particulars about this in the last chapter.) In short, the Bolshevik designates religions as "anti-revolutionary".

On the other hand, Bolshevism demands from its members an unswerving faith in its principles. Burn, so that you may ignite!

Many Bolsheviks go so far in their intolerance (which I, mentioned by the way, think entirely superfluous) as to dictate beforehand what conception of the world should be adopted, even in such remote disciplines as for instance

4) It is an irony of fate that Einstein, who, as we shall see in the last chapter, has done revolutionary work in the sphere of the contradiction of the aprioristic categories of time and space and is therefore recognized as the leader of the new empiric philosophy, not only concerns himself to a great extent with hypotheses and theories based on faith, but even inclines towards religious mysticism.

biochemistry and biology. A highly esteemed elderly scholar sent his treatise about the origin of life on earth to the editorial office of the "Reports of the Leningrad Academy of Sciences". The editor printed the treatise, but added a foot-note in which he said: "We do not agree with the views of the author, but ..."

Bolshevism often manifests so great an intolerance as is otherwise only to be met with in religions. Why? Because Bolshevism is itself a religion.

Bolshevism engrosses all the feelings and all the thoughts of its adept; it fills his entire mind. In the preceding chapter we have seen that after the content of the old religions had become "insolvent", there remained something "deeper and more helpless", i. e. the religious need (George Simmel) and hence research concentrated its attention on religious nature, religious character. Einstein, George Simmel, Goethe, and others, characterize religious nature by its abundance. The great saintly hero of our time, Mahatma Ghandi, also is not so much characterized by the content of his religious conception of the world, as by his religious nature.

Bolshevism is not a substitute for religion, it is itself a religion.

The circumstance that this formulation is fully consistent with that definition of religion which is to be encountered in the great, mystically disposed philosopher, Henri Bergson, is of particular importance.

This philosopher describes the difference between animals and man, who is gifted with intelligence, and he continues, (See "The Two Sources of Ethics and Philosophy", German Translation, Jena 1933, page 208): "But intelligence was not without danger. Up to then all living beings had drunk greedily from the cup of life. They sucked in the honey nature had not on the rim but they also drained off *thi* rest without having seen it. Intelligence however, for its part, saw down to the bottom. For the being gifted

with intelligence did not, any more, live for the moment alone; there is no reflection without forethought, no forethought without uneasiness, no uneasiness without a momentary flagging of the attachment to life . . . Religion is that factor that is to compensate a possible deficiency in the attachment to life in individuals gifted with reflection."

Any one who has encountered reflective laborers of the pre-war social-democratic party and especially Bolshevists shortly after the war, knows that the main question which occupied their thoughts exclusively, was: "If the great social injustice is beyond redress, why should one live?"

And the unceasing self-sacrificing activity of the higher-minded Bolshevists becomes comprehensible.

But to allow mass-movements of religious character to arise, correspondingly favorable factors must come to pass.

And the economic crisis which has visited itself upon humanity after the Great War formed the basis for it.

Only a short time ago, religion still seemed to lead to an intensification of spirituality, to a religious isolation of the individual. Thus the religion of Krishnamurti, the cosmic religiousness of Einstein, etc., etc., arose.

And now we learn that religions which are characterized by group movements, such as for instance "Buchmanism", win over adepts. It is not the individual with his isolating spirituality who stands in their center. The ambitions and needs, the achievements and attainments of the individual are neglected in favor of a group. (5). A group assembles,

5) For the reader who makes higher claims on the author, I shall (in a few words) give some philosophic explanations.

It is here the question of demands which a group, or a nation, or entire humanity makes from an individual. (Moral or ideal demands). The question first arises as to what competence philosophical research has here. There are two points of view on this subject. The first point: Philosophy can only concern itself with the analysis and with the motivation of the spiritual, social, and metaphysical meaning of those moral demands which have already come to consciousness. The second point of view is a practical one. It wants to make the philosopher the "legislator" of man-

in which the members want to help one another, in which among themselves they breed the spirit of a new comradeship. And Rom Landau is right in remarking that a parallelism between this religion and the political movements of the European continent cannot be denied. In order to best elucidate this parallelism, I continue here with the explanations of Coudenhove-Kalergi about nationalism: "Extreme nationalism also, rejects the idea of liberty for the individual. In its opinion, the individual is nothing but a cell of the nation. This nation is idolized as a superhuman personality. To it alone the will to liberty is transferred. To it is given the will to form. Humanity does not count;

kind: the philosopher is, so to speak, to discover these ideal demands and this discovery is to take place independently of their having existed in consciousness or in human usage. To give a crude comparison, which must of course only be regarded as an analogy: In order that a mother can nurse her child, the co-operation of consciousness is not at all necessary or only very slightly so. On the other hand, by the consciousness coming into full effect, we recognize the nursing of the child as "right". A philosopher of this direction thinks, therefore, that humanity makes such demands (as a sense of duty etc.) from the individual as are not variable, absolute truths, (i. e. as are, among other things, independent of the temporal epoch); and these truths are also independent of having been or not been recognized. The majority of the actual philosophies of ethics consist of a more or less confused mixture of these two points of view. The interpretation prevails, that the ethical demands which exist in the consciousness of man are also the "right" one, i. e. that they are independent of their recognition by consciousness. And Kant allows the ethical philosopher only the task of finding the "formula" of ethics but not that of inventing one ... as if before him, the world had been ignorant or in error throughout as to what duty represented.

Here therefore — says George Simmel (See his *\*Chief Problems of Philosophy*) — that assumption comes into effect which is deeply rooted in the metaphysics and the conception of life of the 18th century: that individual man could err, but humanity as a whole could not (Compare the proverb: *Vox populi, vox dei* (The voice of the people, the voice of God)). Can humanity really not err? Let us only study the great variety of their moral principles, which change from epoch to epoch, from country to country, and sometimes are in gross contradiction to one another. What is there in common between the moral of the Fatagonians and Hellenism, between that of Confucius and the Reformation?

man does not count; the nation is everything. Before this new God the merits of personality, of intellect, of human dignity, disappear. Also the immoral action is ennobled, if it serves the nation."

And now we begin to understand why our time is so full of dangers. Because the tendency to group-formation may, among other things, lead also for instance to brigandism. Above, Einstein designated German National-Socialism as "mass-psychosis." Ghandi would here speak of mob-ruble. Nothing is so despicable to him as mobocracy. And this "mystic with the penetrating glance", as Rosnain Rolland calls him, uses all his strength in the endeavor that "the law of the people should take the place of the mob." (6)

Einstein is aware of the dangers that our epoch bears within itself. He writes: "In two weeks the unthinking mass in a country can be excited into such a rage and agitation by the newspapers, that the men are ready to dress themselves as soldiers and kill and be killed for the contemptible aims of any interested person or party." (See Einstein's treatise "Gemeinschaft und Persdnlichkeit", 'Community and

6) There were already many instances in history, where the mob usurped the supreme power of the state. Its leaders outwardly excused the grasping of the supreme power with the necessity of protecting the nation, and promised the mob the realization of its immediate, short-sighted wishes. These wishes were moreover in opposition to what the organism of the people in reality needed for its recovery. These leaders, who in fact were only "fulfillers", appeared to the mob as legislators, i. e. discoverers of the true needs of the organism of the people.

And it is no wonder that of all that which Hitler had promised the plebs, he could keep nothing save the persecution of the Jews and the "Marxists". Neither the promises with regard to the field of foreign politics, nor those in the field of home politics was he able to realize.

It is of interest how in a conversation with Alfred Kerr, in the year 1922, Shaw expressed his opinion about the inoffensive Lloyd George: "Not a politician of a creative nature"; "some time ago he attacked the English Junkers, but he made his career not against, but with them."

How all this fits the "leader" Hitler!

Personality' in the monthly magazine "Die Sammlung", 'Anthology', (Querido Publishing House, Amsterdam).

These words contain a warning against the deification of the mass, and a warning against the depreciation of the individual. Einstein says that, surely, what the individual is and represents, he is and does, not so much as an individual, but as a link of a great human community which guides his material and spiritual existence from his birth to his death. He emphasizes on the other hand, that all material, intellectual, and moral gifts, which we receive from society, take their origin in the achievements of individuals. It was an individual who discovered the use of fire, an individual who invented the steam-engine. Only the individual is able to reason.

Already some years ago, Einstein, in his confession, emphasized that what he really believed valuable in human machinery was not the state, but the creative and feeling individual; only the personality creates the noble and the sublime, while the herd, as such, remains dull in thinking and dull in feeling.

Einstein characterizes our epoch of time as one which, in all spheres, shows a dearth of individualities as well as a dearth of intellectual independence, and lack of feeling for justice in the citizen. And further: "Dictatorships have arisen and are endured, because the feeling for the dignity and the rights of the individual is no longer sufficiently alive."

And yet Einstein writes of himself that he does not belong to the ranks of the pessimists, and that he believes in a better future.

Einstein thinks that the present signs of degeneration are caused by the development of industry and technical progress having intensified the struggle for life of humanity, whereby the development of the individual has been impaired.

Einstein recommends a methodical distribution of work, which in any case has become a categoric necessity.

Such a distribution of work will, in his opinion, lead to the material security of the individual. Einstein therefore approaches the ideas of communism.

Is it possible that we shall reach it by way of an evolution?

## Chapter VII.

# Einstein as a Scientific Research Worker and Philosopher.

Contents: The classical principle of relativity. Velocity of light and the ether of light. Relativity of simultaneousness. The particular theory of relativity. The growth of mass with velocity. Fusion of the laws for conservation of the mass and for conservation of energy. World distance. The ether and the theory of relativity. The further generalization of the theory of relativity. The hypothesis of equivalence. Distortion of light in a field of gravity. The philosophical meaning of the parallelism between forces of inertia and forces of gravitation. The inadequacy of Euclidean geometry in the rotating disk. What is mathematics? Geometry and experience. The perihelic movement of the planet Mercury. Einstein's adversaries. A priori or a posteriori? Einstein on Ernst Mach. What is a fiction? Empirical philosophy. The change in the interpretation of the world. Quantitative deviations in case of a theory. Einstein's law of photo-chemical equivalents and Einstein's law of atomic heat. Science and belief.

The basic law of the Galilei-Newton mechanics, as every one knows, is worded as follows: an independent body, that is a body which is not influenced by other bodies, or generally, a body upon which no force is acting, remains in a condition of rest or of uniformly rectilinear motion. Here the condition of rest is thus equalized to that of uniformly rectilinear motion, i. e. to a motion which occurs with a constant velocity and retains its rectilinear direction; it is designated briefly as uniform progression.

**In order to render** an account to ourselves about the

equalization of these two conditions from a different standpoint, let us imagine the uniform progression of a ship along the shore; in its cabin, a ball is dropped from the center of the ceiling; sitting in the cabin, we ascertain that the ball describes a straight line and strikes the center of the floor, just the same as a ball which is dropped on the shore and is observed from the shore.

All the laws of nature are enacted (speaking generally), according to two systems which are relatively placed to each other in a condition of uniform progression (translation). Consider: the ball which drops on the ship does not describe a straight line when observed from the shore, because the motion of the ship itself is also involved and vice versa. But two experimental stations, of which one is situated on the shore and the other on the ship, will ascertain the same natural laws for their own position. In other words: a body situated in world space, and isolated from other bodies, has no opportunity of ascertaining whether it is in a condition of uniform progression.

It is therefore quite immaterial which system (if two systems in a relation of uniform progression to each other are under consideration) we use for the formulation of the natural laws. This can be expressed generally in the following manner: all systems which stand in a condition of uniform progression to one another are of equal value for the description of the laws of nature. This so-called "principle of relativity in the narrower sense", which can also be formulated in the sense that there are no preferred systems for the description of the laws of nature, seemed to be contradictory to the law of the diffusion of light, and it was hoped that with the help of rays of light, it would be possible to prove uniform progression.

A few facts must first be stated about light. Light diffuses in space with a velocity of 300,000 km. per second.

It was realized that it was a case here of a wave motion, each class of light having a different wave-length. It was further realized that it was a question of electro-magnetic oscillations with wave-lengths of from 0.01 cm. (=ultra-red rays) to 0.000001 cm. (—ultra-violet rays).

To the same type of electro-magnetic oscillations there belong further the waves of wireless telegraphy with their wave-lengths of from 1,000,000 to 1 cm. and also, according to the famous experiments of Max von Laue, the X—rays and Y-rays with their wave-lengths of from 0.000.0001 cm. to 0.000.000.0001 cm.

In order to give an idea of the meaning of this scale, I shall state briefly, that if we could change the oscillatory frequency of a ray of light, i. e. the number of its oscillations in unity of time in the manner as it is done, for instance, in wireless telegraphy, we should be able to effect a direct conversion of a ray of light on one hand, into waves of wireless telegraphy, and on the other, into X—rays.

In the subject matter following below, we shall speak of light waves in short, but shall really have in mind all sorts of electro-magnetic oscillations.

It was assumed with respect to these oscillations that their carrier is the ether and the diffusion of light relative to the ether at rest, was mentioned. The Earl of Salisbury, who was elected about forty years ago as the president of the British Society for the Promotion of the Sciences, said in his speech of welcome: "The chief, if not the only function of the ether, seems to be the furnishing of a nominative for the verb, to oscillate."

How is the structure of this ether to be imagined then?

If the earth in its motion were to push a portion of the ether along before it, as it is the case with the water surrounding a moving ship, a resistance on the part of the ether would have to be observed. Since this is not the case,

it has been assumed that the ether is rigid not only with respect to a ray of light, but also with respect to material bodies, penetrating them in the manner of air going through a sieve.

In this case however, the earth's motion would represent a motion of the earth relative to the ether (=ether-wind) and a ray of light sent out upon the earth in the direction of its motion would have a different velocity from a ray of light perpendicular to the motion of the earth. We would then have a means of proving the motion of the earth, which would be in contradiction to the theory of relativity. To recapitulate: an earthly observer would find the velocity of light greater, if the light would move with the ether-wind.

An attempt was made by Michelson and Morley to prove the presence of this ether-wind by very exact experiments, in the years 1881 and 1887. The experiments however showed negative results. Among other things, this also leads to the result that likewise, we cannot prove a common uniform progression of the earth and a fixed star.

Let us think of another experiment: along a railway bank a ray of light is sent out, its velocity of diffusion along the bank, being 300,000 km. per sec. A railway car is running along the tracks. We will tend to conclude that the research-worker in the car will find the velocity of light less than 300,000 km. per sec, that is, decreased by the velocity of the car.

This, however, would be in contradiction to the principle of relativity, according to which the natural laws should (in the case of a uniform progression) be evidenced in exactly the same manner in the car and on the railway bank.

But also theoretical considerations on the velocity of the diffusion of light would demand that measurement from the car should likewise show the velocity of light to

be the same in both directions, namely in that which the train is taking and in the opposite direction, because it should, of course, be independent from the condition of motion of the source of light.

Finally the fact must be stressed, that it is not only theoretical considerations which demand this independence from the condition of motion of the source of light.

Experiments pertaining to the velocity of the rays of light emitted by moving stars were not able to confirm a dependence of the velocity of light upon the condition of motion of the source of light. Whether we with our earth run towards the rays of light, or whether we run away from the rays of light, we always find the same velocity. Einstein's great achievement now consisted of his raising the constancy of the velocity of light to a principle and proving by an analysis of the conception of simultaneousness that the two principles do not contradict each other and that quite on the contrary, one arrives at a logically flawless theory by the retention of both principles side by side.

Let us now characterize in a few short words, Einstein's particular theory of relativity which arose in this way.

Let us observe the following case:

On two separate spots, A and B of a railway bank, lightning has simultaneously struck the rail. How is one to investigate in this case, whether it really struck simultaneously? Evidently such a definition of simultaneousness will be needed, as will, by its use, make possible a method of deciding experimentally, whether the two strokes of lightning were simultaneous or not. Such a method can be seen in the measurement of the distance AB, after which an observer is posted between the two points, in the center M, with a mirroring apparatus enabling him to see the spots A and B simultaneously. If he then

sees both strokes of lightning simultaneously, they are simultaneous.

One would first be inclined to think that this definition presupposes the hypothesis that the light proceeds with equal velocity along the distances A-M and B-M, and since the investigation of this hypothesis would only be possible if we had at our disposal some method of measuring the time, one thinks that this definition has arrived at an inner contradiction. This, however, is not the case. The statement that light needs an equal length of time to travel the equal distances A-M and B-M, is not a hypothesis, but the establishment of a fact; we thus give a definition of simultaneousness by the co-incident of the two brief light-signals which pass through the same distances, without considering the character of the law of light.

One thus recognizes: the statement that light needs the same length of time for travelling the same distances, or the constancy of the velocity of light:

1. Defines the connection between space and time,
2. Is in accord, as we have seen above, with a great wealth of experience.

We shall now consider the following case: On the railway bank, a train, which is longer than the distance AB, is travelling in the direction A—B; in the instant in which the lightning strikes A and B, the train was passing and covered the points A and B. The question is: if, for the observer on the bank, the striking of the two points by lightning was simultaneous, was it also simultaneous for an observer inside the train?

We again imagine the length of the train to have been measured, and in its center (M) an observer with a mirroring apparatus, so that he can see both point A and point B.

This observer is travelling towards the rays of light

coming from B and is travelling ahead of the rays of light coming from A, and will therefore catch sight of the light-rays from B before he sees those from A: the lightning-discharges into A and B are therefore not simultaneous for him, although they are simultaneous for the observer on the bank. And vice versa, two events taking place in different localities which are simultaneous with respect to the moving train, are not simultaneous with respect to the bank.

For clarity, still another example may be cited.

The task of the particular theory of relativity consists in the representation of our conceptions with respect to the diffusion of light in such a way, that they will not be in any relation of contradiction to the principle of relativity. Let two systems be in a condition of uniform progression (translation) to each other. Somewhere a source of light is situated. The two systems then have different velocities with respect to this source of light. How must the conception of the diffusion of light be constructed, in order to let the rays from this source have an identical velocity of light of 300,000 km. per sec. relative to each of these two systems?

Let two equally long railway trains be in a condition of rest on two sets of tracks parallel to each other, so that the engine of the first train  $A_1$  is on a level with the engine  $A_2$  of the second train. The ends of the two trains  $B_1$  and  $B_2$  are also level with each other.

The distances  $A_1-B_1$  and  $A_2-B_2$  are measured, and in their centers, that is in the center of each train, an observer is posted respectively, who with the aid of mirrors is able to see both ends of his train simultaneously. Let us further designate these centers with  $0_1$  and  $0_2$  and the two observers with M and N.

In accordance with the definition made above, we shall now formulate the conception of simultaneousness in such

a manner so that simultaneousness will be occurring when, for instance, the observer M simultaneously observes in his mirror the lighting up of the bulbs in A, and  $B_1$ . The observer N is on a level with the observer M; he also, therefore, will be able to make a conclusion as to this simultaneousness in  $A_1$  and  $B_1$ . Now let the two trains possess a great uniform velocity relatively to each other. According to the principle of relativity, M will conclude: "My train,  $A_1—B_1$  is in a condition of rest, while on the other hand, the train  $A_2—B_2$  is moving." But the observer N will feel entitled to a statement of the opposite and will say: "My train  $A_2—B_2$  is at rest, and the train A,—  $B_1$  is moving."

Now when M simultaneously observes the flashing of the lamps A, and  $B_1$ , N will conclude as follows about it: "I am in a condition of rest, M is letting his engine run in reverse, and in consequence he will see the light-signal at  $B_1$ , towards which he is going, before he catches sight of the light-signal from  $A_1$ , which he must see with delay; his conclusion of simultaneousness is incorrect."

The same will take place if two bulbs give a flash at the ends of the second train  $A_2—B_2$ ; if these occurrences seem simultaneous to N, they will not seem simultaneous for M.

Let a light-signal now be sent from  $A_1$  to  $B_1$ , and then vice versa from  $B_x$  to A,. The observer M will, of course, conclude that the light will take the same period of time to travel in each of these directions. This conclusion, however, is not authoritative for the observer N and he will judge: "In the second case an observer posted at  $O_1$ , for the observation of the signal from  $B_2$ , will be travelling towards the light, and the light will therefore need less time to reach him."

It is exactly the same in the case of measurements of length. Stress was already laid on the fact above, that the

conception of the constancy of the velocity of light defines the relation of space to time. The observer M will find one value for the distance  $A_1-B_1$ , while the observer N will, in measuring by his system, find quite another value for  $A_1-B_1$ . Thus, not only simultaneousness, but also length of time and the measurement of distance is relative.

We recognize that the "particular theory of relativity" represents a generalization (*Verallgemeinerung*) of the "classical principle of relativity"; not only the mechanical phenomena of nature, as was the case in the classical principle of relativity, but all the phenomena of nature, i. e. also those which belong to the complex of electromagnetic oscillations (—electrical, magnetic, and optical) take their course in such a manner that their laws are independent of the question as to which of the two systems being relative to each other in a condition of uniform translation, we use as the system of reference.

The theory of relativity thus comes to the result, that a statement of time as well as one of spacial distance only has a purpose if the system is stated, with reference to which this statement of time, resp. of space is valid; observed from a second system of reference, which is in a condition of uniform translation to the first, this statement of time, resp. of distance will have a different value. The contradiction between the principle of relativity and the principle of the constancy of the velocity of light, now disappears.

To sum up: Owing to his sense of reality, Einstein has ascribed a greater value to these two principles which are based on experience, than to the unproven metaphysical conception of absolute simultaneousness, and he has sacrificed this conception to the two principles of nature. Without considering the old conceptions of space and time, Einstein has modified them in such a manner that the principle of the constancy of the velocity of light holds

its own beside the principle of relativity and is in accordance with it.

The further problem of the theory of relativity is: How does one find out the time and place of an occurrence with reference to the train, when the time and place of the occurrence are known with reference to the railway bank? The answer to this question is given by the equation of the Lorenz—transformation; in this equation, the quotient of the square of the relative velocity of a reference system and the velocity of light, plays a great part. The velocity of light takes on the character of a critical velocity. The particular theory of relativity renders a brilliant solution to the problems of Fizeau. This physicist carried out the following experiment: Light diffuses with a constant velocity in a tube in which a liquid is at rest. The question is, how great is the velocity of the light with relation to the wall of the pipe, if one causes the liquid to flow through the pipe with a certain constant velocity? The conformity between the figures of the theory of relativity and the measurements of Zeeman was very close.

Further, while according to classical mechanics, the inert mass of a body, i. e. the quotient of force and acceleration, represents a constant value which is independent of the velocity of motion of the body, Einstein came to the result, that the mass of a body must increase with its velocity. In the case of a velocity which approaches the velocity of light, (critical velocity), the mass would grow infinitely large.

The possibility of investigating this result in the case of the very high velocities of the cathode-rays (=electrons) and the p-rays of radium was proved, which fact led to a brilliant confirmation of the theory of relativity. A special success of the theory of relativity could be spoken of, when Sommerfeld succeeded in explaining the fine structure of the spectral lines of hydrogen and helium with the help of the theory of relativity.

One of the most important consequences of the particular theory of relativity is the fusion of the two great natural laws, namely the law of the conservation of mass with the law of the conservation of energy.

It has already been mentioned above, that Einstein arrived at the result, that the mass of a body is not a constant one, and that it grows with the velocity of the body. This increase in mass is equal to the kinetic energy of the body, divided by the square of the velocity of light. Einstein further ascertained that not only an increase in the kinetic energy, but every increase in energy leads to an increase of mass in a body.

The energy content of a body is composed of the stored energy of heat, of the energy of chemical affinity, and of enormous quantities of energy which slumber in the insides of the atomic nuclei.

We gain an idea of these enormous quantities of energy by a study of the radio-active substances, and Einstein came to the result that this energy is stipulated by its mass. If one adheres to this identity between the mass and the energy of a body, one will understand the far-reaching analogy which is valid between the two great laws of nature, namely the law of conservation of mass and the law of conservation of energy.,

After Einstein had denied the absolute significance of the spacial distance between two points, and of the time intervals between two events, the great mathematician Hermann Minkovski was able to show in 1908, that the union of space and time, which is able to represent the world of physical occurrences and which he designated briefly as the "world", retains its independence. Three coordinates of space, together with the ordinate of time, represent the four-dimensional world.

In this four-dimensional world the spacial distance between two points, which according to the theory of

relativity is dependent upon the reference system and therefore has no absolute meaning, is replaced by the "world-distance" which is independent of the reference system, and thus has an absolute meaning.

The question will now be asked: what role is played by the ether in the particular theory of relativity? The answer is very simple. The ether was done away with in the particular theory of relativity. Below I shall quote a few passages from Einstein's lecture "The Ether and the Theory of Relativity", which is characterized by a rare beauty of style. He held this at the Reichs-Universität (State-University) in Leyden on May 5th 1920.

"The development of the theory of electricity along the path indicated by Maxwell and Lorentz brought about a quite peculiar and unexpected turning in the development of our conceptions with respect to the ether. For Maxwell himself the ether was in fact still a formation with mechanical qualities, although with mechanical qualities of a much more complicated type than those of concrete solids. But neither Maxwell nor his successors succeeded in working out a mechanical model for the ether which would have supplied a satisfactory mechanical interpretation of Maxwell's laws of the electro-magnetic field. The laws were clear and simple, the mechanical interpretations clumsy and full of contradictions. Almost imperceptibly the theoretical physicists, in particular under the influence of the electrodynamic investigations of Heinrich Hertz, adapted themselves to this state of affairs which was very discouraging from the standpoint of their mechanical program. While in fact they had previously demanded from a conclusive theory that basic conceptions belonging exclusively to mechanics (for instance mass densities, velocities, deformations, forces of pressure) should suffice for it, they gradually became accustomed to permitting electric and magnetic field-strengths to exist

as basic concepts beside the basic concepts of mechanics, without demanding a mechanical interpretation for them. In this way the purely mechanical conception of the world was gradually abandoned. This change however led to a dualism of the basic concepts, which eventually became insupportable . . .

"With H. Hertz, the indicated dualism is still unmitigated. With him matter appears not only as a carrier of velocities, kinetic energy, and the mechanical forces of pressure, but also as the carrier of electro-magnetic fields. Since such fields are also evinced in vacuo—i. e. in the free ether—the ether also appears as the carrier of electro-magnetic fields . . .

"Matters stood thus, when H. A. Lorentz interfered. He brought the theory into accordance with experience, and succeeded in this by a wonderful simplification of the basic concepts. He achieved this most important development of the theory of electricity since Maxwell, by depriving the ether of its mechanical, and matter of its electro-magnetic qualities . . .

"The most immediate standpoint which one was able to take up with respect to this state of affairs seemed to be as follows: the ether does not exist at all. The electro-magnetic fields are not conditions of a medium, but independent realities, which do not lead back to anything else, and which are tied to no carrier, just the same as the atoms of ponderable matter."

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Up to now we have used the particular theory of relativity as the basis of our considerations. This principle signified that two systems, which relatively to each other are in a condition of rest or in a condition of uniform translation, are equivalent for the description of the natural laws; no system is favored above the other; a single system existing in world space has no possibility of judging wheth-

er it is in a condition of uniform translation, or in a condition of rest; an absolute motion has no meaning; space in itself cannot be considered as a reference system.

All this did not, therefore, refer to all sorts of motion, but simply to uniform translation; and, for instance, with respect to a uniformly accelerated motion, the particular theory of relativity has no validity.

This would mean that if a single body were situated in world-space, and at the same time were in a condition of uniformly accelerated motion, an observer situated on this body would then be able to ascertain its motion; space would in this case represent a favored system of reference.

Already in 1907, Einstein's philosophical nature was striving to generalize the particular theory of relativity: the principle of relativity was to be valid for any chosen condition of motion in a body.

First however, we shall send ahead a few facts about gravitation, as well as about accelerated motion.

The question as to why objects fall to the ground is generally answered by the statement, that they are attracted by the earth. Modern physics denies this far-reaching action and treats gravitation analogously to the attraction of a piece of iron by a magnet.

According to Faraday a magnet calls forth something physically actual in its environment and this he designated as the "magnetic field". The magnetic field in turn acts upon the iron, where after the piece of iron begins to move towards the magnet.

Thus arose the conception of the electro-magnetic field, through which the electro-magnetic phenomena and especially the electro-magnetic waves have received a satisfactory representation.

Quite in analogy one speaks of the field of gravitation which is produced in the neighbourhood of masses and

acts upon other masses. Finally, a space in which forces of inertia arise, is designated as a "field of inertia".

Accelerated motion we can recognize by the vigorous backwark jerk which we feel sitting in a car which proceeds from a constant velocity into an accelerated one. If the brakes are put on, we feel a forward jerk. Acceleration awakens forces of inertia in the body, i. e. a resistance which is directed against the motion.

Newton's mechanics assumed that it was not the question, here, of a relative acceleration of one body with respect to another body, but that it was the question of an absolute acceleration; in other words, if a body were quite alone in the world, even then an acceleration would call forth forces of inertia in it, and it would then be able to ascertain the motion with respect to empty space.

This conclusion however cannot be attained from facts of experience; we are not in a position to remove the earth and the canopy of stars in order to carry out such an experiment. There is nothing which forces us to believe ! in this assumption of Newton's mechanics.

And Einstein drew the conclusion: only through a mutual interaction of one body with other bodies are forces of inertia awakened in them; if a body existed quite alone in the world by itself, it would have no inertia, quite analogously to the fact that the gravity of a body is effected by a mutual interaction with other bodies and a body existing quite alone in the world by itself, would have no gravity.

Einstein has lent a high degree of probability to this hypothesis, which has arisen out of purely philosophical deliberations, i. e. purely out of the striving to generalize the principle of relativity by linking this hypothesis with the firmly based fact of experience, namely with

the fact of the proportionality of inert and weighty matter.

According to Newton's law of motion:

(Force) = (inert mass) • (acceleration).

If the accelerating force happens to be gravity, we can write:

(Force of gravity) = (inert mass) • (acceleration).

And if the intensity of the field of gravity is a constant one, which for instance is the case in drop-experiments with different bodies, but from the same height, then the force of gravity is proportional to the heavy mass and we write:

(Heavy mass) • a constant = (inert mass) • (acceleration).

A peculiar law of experience now comes into effect: bodies which move exclusively under the action of the field of gravity experience an acceleration which is dependent neither on the material nor on the physical condition of the body. A piece of lead and a piece of wood will fall with equal rapidity in a space containing no air. And we recognize that constancy of acceleration means a proportionality of the heavy and the inert mass.

This proportionality may be formulated in still a different manner. The inert mass of a body is decided by the value of the force which is necessary to lend it the unity of acceleration. Then the proportionality of the inert and the heavy mass will signify the following: in order to lend a body the unity of acceleration, the force used must increase with the weight of its heavy mass; in fact there is a strict proportionality here. Einstein's statement that inertia only arises through a mutual interaction with other bodies and that a body which is alone by itself in world space has no inertia, can now be easily understood: we have in our possession a pistol with the cartridge and bullet belonging to it, the inert mass of which was determined by us on the earth. Let us imagine ourselves trans-

ported, together with this pistol, to a planet which is much smaller even than our moon. There the heavy mass and, therefore, also the inert mass of the bullet will be very small; a very small amount of force is sufficient to lend the bullet the unity of acceleration. If the pistol is discharged there, the bullet will attain so great a velocity, that it will disappear from the planet's zone of attraction.

This law is in no connection with Newton's mechanics; it stands completely isolated; we have registered it without being able to interpret it.

If, for instance, a lead sphere which is ten times as heavy as a wooden sphere of the same size would have the same inert mass as the latter, it would then, as we can see by the equation, fall ten times as quickly as the wooden sphere, and this fact would present no contradiction to Newton's mechanics.

Let us now imagine a stretch of empty world space which is at such a distance from the stars that the following basic principle of Galilei would be true: A speck of mass left to itself moves uniformly and in a straight line. Let there now be present in this empty world space, a large box in which an observer with his instruments has taken up his position. For this observer and his instruments, there is no gravity: everything floats in the center of the box.

Let there be a hook and rope fastened to the center of the lid of this box from the outside; let some one suddenly begin to pull at this rope with a constant force. The box will then begin to move with a uniform acceleration.

How will the observer in the box imagine this occurrence? First he will observe that he and his apparatus fall to the floor. Every object that he wants to place in the center of the box as before, that is into space, again approaches the floor with an accelerated motion.

The observer will ascertain that it is the question of

a constant acceleration, quite independent of which body he uses for his experiment.

Because of the resulting proportionality between heavy and inert mass, the observer will be quite unable to ascertain whether he is hanging in a field of gravity, i. e. whether a large mass which is attracting him has suddenly originated under his floor, or whether he is moving upwards with a uniformly accelerated motion.

One thus recognizes that the proposition of the proportionality of heavy and inert matter is a necessary preliminary condition for the validity of the generalized principle of relativity.

For better comprehension, let us take Einstein's train of thought in reversed order; the experienced fact of the proportionality of inert and heavy matter leads to the impossibility of deciding whether it is a case of uniform acceleration or of a field of gravitation. The acceleration of a single body then loses its absolute character. A singleness of meaning only exists in the case of the acceleration of one body with respect to another. The generalized principle of relativity is given the character of a thought-necessity.

And one sees that the observation of the accelerated box can yield important results about the laws of gravitation. Einstein thus formulates his hypothesis of equivalence:

A homogeneous field of gravity, from the standpoint of physical occurrences, is equivalent to a field of inertia which is produced by uniform acceleration.

In order to give an example of the conclusion of the legitimacy of the field of gravity from this analogy, the distortion of rays of light in a field of gravitation may be discussed briefly.

A box which has a small opening in the center of one side moves upwards with a uniform velocity. During its

motion upwards a ray of light was momentarily sent in through the opening. The question is, which path the ray of light will travel until it strikes the opposite side of the box.

Were the velocity of light infinitely great, the ray of light would strike the spot which is directly opposite to the opening.

Since however, the light needs a certain period of time to reach the other wall and the box is moving upwards during this time, the ray of light strikes a spot which is lower than the center.

If the upward motion of the box takes place not with constant but with uniformly accelerated velocity, the ray of light will (from the standpoint of an observer inside the box) describe a line which is curved downwards.

Thus rays of light describe curved path in accelerated systems. As, however, the formal laws of an accelerated system are identical with the laws of a system at rest in a field of gravitation, a ray of light must undergo a distortion in a field of gravitation.

The curvature of the ray of light must be similar to the path of a discharged bullet. In the strong solar field, of gravitation, the ray of light emitted by a fixed star should be deflected, according to Einstein's calculation, by an angle of 1.7 arc seconds, when the ray of light passes directly beside the limb of the sun. The investigation of these prophetic figures of Einstein's may consist in the taking of the constellation of a star, first when its ray of light is just grazed by the sun, and then again when the sun has a different position in the sky. To make possible the taking of these photographs, one must of course wait for a total solar eclipse.

Under the direction of the British astronomer, Eddington, two expeditions were sent out on the occasion of the solar eclipse on May 29th, 1919; one to Lebral in Brazil

and the other one to the Principe Islands on the East-coast of Africa. A few months later a comparatory photograph was taken for another position of the sun. By this, the prophecy of Einstein was confirmed.

The opponents of the theory of relativity immediately attempted to attribute the deflection of the rays of light to other causes. As one of these, the possibility of a deflection of the rays of light in the same direction by a refraction of the rays in the solar atmosphere was especially indicated. In order to prove correct however, these opponents must first show that the possession by the sun of such an atmosphere and its attributed characteristics can also be proved by other calculations or experiments.

Before this has occurred however, that theory is naturally preferred which has uniformly represented a great number of experienced facts with a minimum of hypotheses, and has prophetically discovered new facts of experience.

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Before we go any further, a brief repetition may be made first: the general theory of relativity tries to effect validation of the principle of relativity not only in the case of systems which bear a relation of uniform translation to each other, but also in the case of systems which array out any kind of motion with respect to each other. Accordingly, the motion of a single body alone for itself (absolute motion) is meaningless, irrespective of the question as to what kind of motion is involved; only the motion of a body relatively to another body can be perceived.

In other words, it is quite immaterial which of the two bodies moving relatively to each other we consider as "resting" and which as "moving".

Ernst Mach has already pointed out that the Ptolemaic interpretation of the world (the earth is at rest and the sun revolves around the earth) has just as much justification

as the Copernican conception of the world (the sun is at rest and the earth revolves around the sun). The latter is simply more appropriate, that is, it leads more easily to a quantitative description of natural phenomena.

Newton was of the opinion that the rotation of a single body bears an absolute character by calling forth centrifugal forces, that is, forces of inertia, describing this by means of his famous experiment with the rotating bucket full of water. This standpoint was invalidated by Mach.

Mach has thus drawn attention to those faults of classical mechanics which, thirty years later, led Einstein to re-build the whole system of mechanics entirely.

Newton's theory of gravitation and his mechanics yielded an exemplary description of many natural phenomena, but because their philosophical bases were unsatisfactory, they could only be expanded, in order, for instance, to explain the forces of inertia, the perihelic motion of the planet Mercury etc., by a complete re-building of their basis.

In the new theory the two conceptions of the forces which, for instance, originate by a rotation of the earth about its axis and which go by the names of "centrifugal and Koriolis forces", must be equally privileged.

These forces than can be interpreted as:

i. Forces of inertia, if the fixed star heaven is considered at rest and the earth is imagined in rotation about its axis.

2. As forces of gravitation, if the earth is imagined at rest and the fixed star heaven as rotating about the earth, so that the same relative rotation takes place.

One can see from this that the philosophical meaning of the parallelism between the forces of inertia and gravitation respectively does not consist in the fact that it is purely the question of an analogy here; the link here is a closer one: it is the case of one and the same phenomenon,

which seen from one standpoint appears to us as "inertia" and from another as "gravity".

For this reason Einstein speaks not of a proportionality between heavy and inert mass, but of their equality. This results in the case when unities have been chosen which let the factor of proportionality become equal to 1. And Einstein concludes: "The same quality of the body manifests itself, according to existing conditions, either as 'i n e r t i a' or as 'g r a v i t y'."

Thus all the phenomena called forth by the rotation of the earth, such as the oblateness of the earth, rotation of the pendulum plane in the Foucault pendulum experiment etc., may just as well be interpreted as forces of gravitation.

We should reflect that in Newton's law of gravitation, only the effects of the masses and their distances from one another are taken into account, but not the effect of the condition of motion of the masses. According to Newton, the fixed stars, whether they are rotating about the earth or are in a condition of rest with respect to the earth, exert the same effect. That gravitation which follows from Newton's law may be designated briefly below as "Newton's gravitation".

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After the reader has understood the above concluding sentences, I shall now explain Einstein's special case of centrifugal force.

Let there be a region of time and place in which there is no field of gravitation with respect to reference system A; then with respect to A, the basic principle of Galilei about the body left to itself which is in a condition either of rest or of uniform translation, will be valid.

Let the same be true for another body which we designate as reference system K; in other words: also between A and K there is no gravitation according to Newton. But

**now** let K, which for the sake of simplicity shall have the **form of** a level disk, carry out a uniform rotation around its center, relative to A.

On disk K an observer is posted eccentrically, and experiences a force which acts outwards in a radial direction. Another observer, who is stationed on the body A, will conclude that it is the question of a centrifugal force, i. e. a force of inertia.

Contrary to this, the observer on the disk K will judge the existing condition as follows:

"I am in a condition of rest, but the system A is rotating about my disk and although that which I experience is not Newton's gravitation, it is nevertheless the effect of such a field of gravitation as disappears in the center of the disk and increases proportionally to the distance from the center outwards."

This observer now tries to make specifications of space and time with respect to his disk, whereby he uses measuring sticks and clocks.

First the observer fastens a clock to the central point of the disk, after which he fastens a like clock on the periphery of the disk; both clocks are thus in a condition of rest with respect to the disk K.

According to the particular theory of relativity, the observer on the non-rotating body A, will conclude that the clock on the periphery of K goes more slowly than that in the center of K. Let us now imagine an observer who is stationed in the center of the disk, beside the clock fastened there. This observer will come to the same result as the observer on the system A: relative to his clock, the clock on the periphery is slower; he will further find that clocks go with different rapidities on different concentric circles. A definition of time has no meaning on a disk.

It is exactly the same with the measurement of length. **The** definition of spacial difference leads to great difficulties.

For if the measuring stick is applied tangentially to the periphery of the disk, the former (judged from the system A) will show a reduction in length, because bodies moving in the sense of the particular theory of relativity are foreshortened in the direction of the motion; on the other hand, the same measuring stick does not undergo any reduction in length in the direction of the disk radius.

The observer will thus come to the result that the proportion of the disk-circumference to its diameter, does not yield the same Euclidean geometric value  $\pi$ , but a greater value.

Here I must give some preliminary facts from the field of geometry, but before I do this, I want to remark briefly, that when a "curvature of space" is spoken of in the general theory of relativity, it must be understood that Euclidean geometry has no validity there.

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In the geometry of Euclid, the axiom of the parallel (briefly designated as the "axiom of parallels") plays a great part: only with the help of this axiom is it possible to prove that the sum of the angles in a triangle is equal to two right angles.

In the history of geometry there is no dearth of experiments trying to prove this axiom; in other words, it was doubted whether it was here really the case of an axiom, that is something which it is impossible to prove on principle. It was believed that negation of this axiom, (i. e. the declaration of this axiom as incorrect and acceptance of all the other axioms of geometry) would lead to a contradictory structure if this axiom was no true axiom. (7)

It hereby became apparent that the "non-Euclidean

7) For it must lead to a logical contradiction if one proceeds from the validity of several statements, while at the same time one affirms the invalidity of a necessary conclusion from these statements.

geometry" formed in this way, designated as "Lobatschewsky-geometry" after its discoverer, is free from inner logical contradictions. It is of quite a different type, however, as compared to Euclidean geometry and the theorem that the sum of the angles in a triangle is equal to two right angles, is invalid there.

If we now ask, in which way plane geometry differs from the geometry on the surface of a sphere, we shall first be able to ascertain that the angle-sum of a triangle, the sides of which are thus equatorial circles (Grosskreise), is greater than the sum of two right angles. The value by which the sum of the angles exceeds it is proportional to the surface of the triangle.

The Pythagorean theorem (the square of the hypotenuse is equal to the sum of the squares of the two shorter sides of a right-angled triangle) is likewise inadequate on the surface of a sphere.

The great mathematician, Gauss, now developed the theory of surfaces by a generalization of the Pythagorean theorem. This theory teaches how to calculate this surface without going outside of it, i. e. simply from data which are taken from distances on the surface.

Finally, in 1854, Riemann again showed by a generalization of the Pythagorean theorem, how non-Euclidean geometry can be represented by the Gauss theory of surfaces.

The reflections which these great mathematicians developed with respect to our world—space led to the result that a priori we can have no certainty as to whether our world-space is Euclidean or not.

It is purely an empirical matter. Although measurements carried out with very large triangles showed no deviation of the angle-sum inside of the measuring accuracy of two right angles, one nevertheless could not

claim with absolute certainty, that our world-space shows no curvature.

What is mathematics now? Let us listen to what Einstein says on this subject ("Geometry und Erfahrung", 'Geometry and Experience', Berlin 1921): "How is it possible that mathematics, which after all is a product of human thought gained independently of all experience, is so excellently suited for all objects of reality? Is it possible that human reason can fathom the properties of real objects by pure thought?"

"According to my opinion, this may be answered briefly in so far as the theorems of mathematics pertain to reality they are not certain, and in so far as they are certain, they do not pertain to reality. Full clearness about the state of affairs seems to me only to have become a general possession by means of that tendency of mathematics which is known by the title of 'axiomatics'. That is to say, the progress achieved by axiomatics consists in the clean separation of the logically formal from the objective or concrete contents; according to axiomatics, only the logically formal, but not the concrete or other contents tied up with the logically formal, represents the subject of mathematics."

Mathematics in the true sense of the word can thus pronounce no decision with respect to objects of concrete conception, and objects of reality. In axiomatic geometry "point" and "straight line" are thus only notions empty of any meaning.

Above, in the description of Einstein's sense of reality, we have already seen that geometry originated out of the art of measurement.

Now axiomatic geometry can make no statement with regard to objects of reality (=practically rigid bodies). In order to convert "axiomatic geometry" into "practical geometry", says Einstein, one must pronounce the following sentence; "Solid bodies behave with respect to the pos-

sible positions they can occupy, like bodies of Euclidean geometry having three dimensions; then the theorems of Euclidean geometry will contain statements about the behaviour of practically rigid bodies. The geometry supplemented in this way is evidently a natural science; we can actually look upon it as the oldest branch of physics."

This practical geometry rests not only upon logical conclusions, but essentially upon induction from experience.

Now the question as to whether the practical geometry of the world is a Euclidean one or not, becomes clear.

Of course only experience can answer this question.

"I attribute a special importance—says Einstein—to the interpretation of the geometry described, because without it, it would have been impossible for me to construct the theory of relativity. For without it, the following consideration would have been impossible: in a reference system rotating with respect to a system of inertia, the laws of placement of rigid bodies do not conform to the rules of Euclidean geometry on account of the Lorentz-contraction; Euclidean geometry must therefore be abandoned with the admission of non-inertial systems as equally privileged ... If one rejects the relation between the body of axiomatic Euclidean geometry and the practically rigid body of reality, one easily arrives at the following interpretation which the sharp-witted and profound H. Poincare favored in particular."

This standpoint of Poincare may be mentioned only briefly here, because it has already lost its significance today.

We have seen that axiomatic geometry alone ( $=G$ ) does not contain a statement with respect to reality, but only corresponds to reality in connection with physical propositions ( $=P$ ); symbolically we can state that only the sum  $(G)+(P)$  is subject to the control of experience. Since it is only a question of this sum, Poincare believes that geometry

may be chosen at random, and since of all possible systems of geometry the Euclidean one is the simplest, it can be retained according to Poincare and the laws of physics can be changed in such a manner that  $(G)+(P)$  remains unchanged. In other words, Poincare rejects the equivalence of the practically rigid body of experience and the body of geometry.

This rejection already is not permitted by Einstein's sense of reality. As regards the laws of physics, their modification in the sense of Poincare would mean that part of them would receive an arbitrarily axiomatic character and thus would have to digress from reality.

Einstein ties up geometry with reality much more profoundly by giving geometry a physical interpretation. Unfortunately this interesting subject cannot be given a more detailed discussion here.

We shall now return for a short time to the consideration of the triangle on the surface of a sphere. What are the lines of this triangle? What replaces the straight line of the plane on the surface of a sphere? We make use of the definition of the straight line of a plane: it is the shortest distance between two points.

If we now join two points on the surface of the sphere by different lines, we recognize that the straight line of the plane corresponds to the equatorial circle of the spherical surface: it is the shortest line between two points on the surface of the sphere.

Independently of the kind of surface in question, one designates the shortest distance between two of its points as the "geodetic line".

Above we have discussed the "non-Euclidean" or "curved space" as a space, the measurement of which, results in a departure from Euclidean geometry.

We shall now apply the parallelism between forces of

inertia and forces of gravitation to the disk K rotating relatively to the system A, as described above. It then follows that: gravitating masses cause a distortion of space.

The character of the distortion is given by the Einstein field-equations; they play the part of Newton's law of gravitation.

Einstein's law of motion is: in the curved world the bodies move according to geodetic lines.

This law represents the most general form of the law of motion. There is no mention of acceleration, or of forces, or of any condition of motion at all. The basic concept of the old system of mechanics is that special case of this law in which the field of gravitation is absent: the world is not curved there, and the geodetic line is a straight line (=the body moves uniformly in straight lines).

The general principle of relativity can now receive the following formulation:

To the laws of nature may be given such a mathematical form as will be independent of the relative condition displayed by the body. (8)

8) Finally, Einstein's formulation of this general theory of relativity may be mentioned literally. In this formulation, the movement of a body is not referred to the Cartesian system of coordinates, which, as we know, presupposes the validity of Euclidean geometry, but to the Gauss system of coordinates which represents a logical generalization of the Cartesian system of coordinates and which may be used also in the case of non-Euclidian space. If one replaces the conception "reference-body" by the conception "system of coordinates", then the particular Principle of relativity is worded as follows: "If  $K_1$  is a system of coordinates which experiences a uniform and freely rotatory motion with respect to  $K_2$ , then the natural phenomena occur with respect to K, according to exactly the same general laws as with respect to  $K_2$ ". On the other hand, the general principle of relativity says: "All the Gauss systems of coordinates are in principle equivalent for the formulation of the general laws of nature."

Finally a few words may be said about the deductions from the general theory of relativity.

The deflection of the rays of light in a field of gravitation has already been mentioned above.

A further deduction is the perihelic motion of the planet Mercury.

Kepler found a law by empirical methods, according to which the orbits of the planets are ellipses in one of the foci of which is the sun. This law of Kepler's later arose by theoretically deductive methods from Newton's theory of gravitation.

It must be pointed out however, that the empiric law of Kepler can only demand an approximate validity, while Newton's calculation of the planetary orbit was carried out with neglect of the influence exerted by other planets. If one takes this influence into account, a deviation from the orbit of the ellipsis results, namely its "disturbance" or its perihelic motion. "Periheleon" is the origin nearest to the sun, in the ellipsis. The "disturbance" now consists in the fact that the ellipsis slowly rotates with respect to the fixed star heaven, so that its perihelon describes a slow motion.

Now it appears that the perihelic motion of the planet Mercury cannot be explained through the influence of the other planets. And, in fact, the result is that the difference between the observed perihelic motion and that calculated from the disturbances amounts to 43 arc seconds per century. If on the other hand the motion of the planets is calculated by means of Einstein's theory of gravitation, one gets a rotation of the elliptic orbit which amounts to 43 arc seconds per century on 1 y if the gravitatory action of the sun in the case of the planet Mercury is taken into consideration. Here one immediately is able to recognize the superiority of the Einstein theory to the classical theory.

If I now proceed to the opinions of Einstein's opponents, I first want to lay stress upon the fact that here, in contrast to that which was described in many cases by the former chapters, we shall find a contradiction of a purely objective nature. Thus one of his philosophical opponents deems it important to emphasize:

"The fact that feelings of a non-scientific nature are quite foreign to me, is known by all who want to know it. Yes, I even feel quite closely related to Einstein in a human, and also in an ethically political respect . . ." (Hans Driesch, "Relativitätstheorie und Weltanschauung", 'The Theory of Relativity and the Conception of the World', Second Edition, Publishers Quelle-Meyer in Leipzig, 1930; page 41).

Further I do not want to omit mentioning that there are scholars who belong among the eminent interpreters of Einstein's teaching, but who do not acknowledge the philosophic world-conceptive consequences of his teaching which will be discussed later on. Thus, for instance, Bertrand Russel in the discussion of Kant's conceptions of time and space in conjunction with the theory of relativity, expresses himself as follows: "I see no reason why the philosophers should not all adhere to their former beliefs in these matters."

In contrast to this, the book of this scholar about the theory of relativity belongs to the most interesting works on this subject. In it the reader can study the mathematical fields of the theory of relativity in a generally intelligible form. The judgment which Bertrand Russel has formed of the theory of relativity will become clear to the reader from the following three quotations concerning the conception of the interval (designated above as the "world distance"):

"The theory of relativity contains as little of the paradox, as is still just in agreement with the facts. Moreover,

the appearance of paradoxy entirely ceases in it after a certain time."

"This interval, as previously stated, has the same value for all observers and represents a true physical relation between the two events, which is not true for the distance of time and space."

And finally:

"The deeper we penetrate into the structure of the world, the more important this conception proves to be; one would like to say that it contains reality, of which spacial distance and the elapsing of time are only hazy notions. The theory of relativity has changed our opinion of the inner structure of the world, and in this fact lie both its difficulty and its significance."

Some opinions out of the abovementioned book by Hans Driesch may now be discussed. These opinions in fact are typical for a great number of Einstein's philosophical opponents.

A reader of Driesch's book will first be surprised by the fact that objections of a purely physical nature are also made against the theory of relativity. Because this is of general interest and because it can also contribute to the elucidation of the basic concepts of the theory, these purely physical objections may also be mentioned. Driesch writes: "The result of the Michelson experiment was in fact generalized in a certain direction, without new experimental data being present for it, and without noticing exactly what was being done. It is said that any chosen light originating from any chosen source, thus also one not itself belonging to system A, perhaps the earth, is transmitted relatively to and measured from the system A with equal velocity, whether the system A happens to move or to be in a condition of rest with respect to the source of light."

The reader already knows from the short description

of the theory of relativity, that it is not the case here of a mental extension of Michelson's experimental result, but of other experiments which were carried out independent of Michelson's question and in a different logical direction. For the sake of completeness I still wish to remark that these other experiments, among other things, disproved the hypothesis of the physicist Ritz, which said that the constancy of the velocity of light was only present relatively to a reference-system at rest with the source of light.

It was a long, difficult scientific path, which led to the principle of the constancy of the velocity of light in the particular theory of relativity! And if in more recent times Emmanuel Lasker expresses the opinion that the empirical value of  $c=300,000$  km. per sec. is not given a priori (denknotwendig) and makes the suggestion to adopt limit  $c= \infty$ , one can recognize that this suggestion likewise is not in agreement with experience I

Driesch says further that Einstein's doctrine is not a law of nature and in any case contains nothing of significance for the substance of nature, but solely concerns a possible limitation of human means of research.

The reader, who is already informed about the explanation of Fizeau's experiment on the increase of mass with velocity etc., will be quite able to form his own judgment on this matter and especially in the reflection on the conception of world-distance, which as we have seen above, bears an absolute character, will find that the tragedy is not so great with respect to "the limitations of human means of research".

Driesch, like most of the philosophers, directs his chief attacks against Einstein's negation of the absolute character of the spacial relation and the differences of time, and speaks of a "natural space" a "natural time" and of space in the sense of Kant, as the "form of external meaning."

Here I must state a few preliminary facts. Newton, in the preface of his famous work "Philosophiæ naturalis principia mathematica" (Mathematical Principles of Natural Philosophy) develops the following conceptions on time and space:

"1. Absolute, true, and mathematical time, expires in itself and due to its nature, uniformly and without relation to any external object.

2. Absolute space, due to its nature and without any relation to an external object, constantly remains unchanged and immovable."

Already Ernst Mach remarked to this, that Newton makes statements here which exceeded the description of the actual in nature. Would there be a space, if no bodies existed in it?

What is a priori here, and what a posteriori?

With reference to Ernst Mach, Einstein wrote as follows ("Physikalische Zeitschrift", Vol 17, 1916, page 101): 'The importance of such minds as Mach, lies by no means only in the fact that they satisfy certain philosophical needs of the era which the inveterate specialist may designate as luxury. Conceptions which have proved useful in the classification of things easily attain such an authority over us that we forget their earthly origin and accept them as unalterable facts. They are then marked as 'thought-necessities', 'things which are given a priori', etc.. The path of scientific progress is often made insurmountable for a long time by such mistakes. It is thus by no means an idle pastime if we acquire a training in analyzing conceptions which have long been familiar to us and in showing on what conditions their justification and usefulness depends, and how they arose singly from given points of experience. By this, their all too great authority is broken. They are removed if they cannot prove their identity in a regular manner, they are corrected if their

co-ordination to the given facts was all too careless, and they are replaced by others if a new can be built up which we prefer for some reason. Analyses of this kind usually seem superfluous, affected, and sometimes even ridiculous to specialized scientists, whose attention is turned more in a single direction. The situation undergoes a change however, if one of the habitually employed conceptions is to be replaced by a more exact one, because the development of the respective science demands it. Then those who have not been fastidious with respect to their own conceptions, raise a violent protest and complain about a revolutionary menace to their holy of holies. With this clamor are mingled the voices of those philosophers who believe that they cannot do without that conception because they had laid it away in their treasure-chest of the 'absolute', the 'a priori', or in short had filed it in such a manner that they had proclaimed its essential immutability. The reader has already guessed that I am alluding by preference to certain conceptions on the subject of time and space and of mechanics, which have undergone a modification by the theory of relativity. No one can deny the perceptive theoreticians their due for having smoothed the way for development here; at least, in my own case, I know that I have been greatly furthered by H u m e and M a c h, both directly and indirectly."

Already in Aristotle the perception is present that space in itself is the medium of "contact". The same perception is contained in the definition of motion by Descartes: "removal of a part of matter or a body from the neighbourhood of the bodies which are in direct contact with it and are considered as being in a condition of rest, into the neighbourhood of other bodies." Lobatschewski formulates the essence of spacial form in the following manner: "Contact represents the distinguishing feature of bodies, and we are indebted to it for the name,

geometric bodies, as soon as we retain this characteristic in them, while we do not consider all the others, whether they happen to be essential or accidental."

But even when with Kant one confronts the matter of the phenomena with space, it nevertheless does not follow that in this confrontation space will be designated as a "form of conception" and ascribed an absolute character.

The more recent mathematical axiomatic problems of research distinguish between the "mathematical space" which has originated out of axioms assumed at random and the "physical space" of theoretical physics, which thus is a part of the physical construction of the world.

But what does aprioristic philosophy do now?

It directs its attacks against metageometry (non-Euclidean geometry), declares it to be something in the nature of a fiction, (imagined formation) which has nothing to do with "nature", and because not only the "mathematical space" but also the physical space of the theory of relativity belong to the realm of non-Euclidean geometry, it believes to have disposed of the theory of relativity once and for all. We read in Driesch:

"The ontological criticism of the general theory of relativity thus amounts to a criticism of the so-called metageometry, in so far as this makes claim of being applicable to 'natural space' and thus serving as the basis of natural scientific theory."

The philosopher thus declares himself a natural scientist who degrades important pieces of research in natural philosophy to the level of a purely mathematical fiction, as soon as they show a connection with non-Euclidean geometry, while he raises Euclidean geometry and absolute time to the rank of absolute, holy truth!

What is a fiction? The farthest advances into this question have been made by Hans Reichenbach. (Hans Reichenbach's treatise "Der gegenwartige Stand der

Relativitätsdiskussion", 'The Present State of the Discussion of Relativity', in "Logos, Internationale Zeitschrift für Philosophie der Kultur", 'Logos, International Magazine for the Philosophy of Culture', Vol X, No. 3 is cited here.) It was contended that the theory of relativity worked with fictions and the belief was held that an explanation was contained in "Philosophie des Als Ob" ("Philosophy of the As If"), Leipzig, 1922.

(See Hans Vaihinger "Die Philosophie des Als Ob", Leipzig 1922, 7th and 8th Edition.)

The Congress of Fiction-Philosophers held in Halle in 1920 investigated the theory of relativity *in detail* and rejected it.

According to Vaihinger, a fiction is a psychic formation to which no reality directly corresponds. To this Reichenbach replied: "In a certain sense one can designate all conceptive formations as fictions, for they are all psychic formations which can never be interpreted as reproductions of reality; they are determined by the nature of thought and are nothing but a means of comprehending reality."

This interpretation Einstein confirmed to me in a conversation which I happened to have with him, by saying that as was already indicated by the philology of the word "fiction", every conceptive formation can be understood as a fiction.

But let us keep to Vaihinger's standpoint. Vaihinger distinguishes the fiction from the hypothesis: "While every hypothesis wants to be an adequate expression of a still unknown reality, and wants to reproduce this objective reality in a conclusive manner, a fiction is set up with the consciousness that it is an inadequate, subjective, figurative method of conception, the congruence of which with reality is excluded beforehand, and which also for this reason cannot be verified afterwards as one hopes to do in the case of a hypothesis."

I, for my part, do not agree with this interpretation; not every kind of a hypothesis—in spite of being correct—represents an adequate expression of a still unknown concrete reality. Everything depends on the form of the hypothesis. If we say: "Solutions, in relation to osmotic pressure, have such properties as if they were gases", the proof of this statement by no means leads to the assertion that solutions and gases are identical. It is simply the question here of an analogy between the laws of the gases and the laws of solutions. In fact one thinks in analogies!

But let us remain for the present with the standpoint of Vaihinger.

It is a fiction, for instance, if in the theory of relativity one mentions the observers who manipulate the light - signals.

For the time-corrections which are concerned in the theory of relativity are much smaller than our errors of observation. The observers may be eliminated however; they have been introduced solely for pedagogic purposes.

Reichenbach further draws our attention to the fact that if many statements of the theory of relativity can only be subjected to an indirect test, they still do not receive the character of fictions because of this fact.

Finally, Hans Reichenbach in a very interesting manner discloses an error made by the critic of the theory of relativity: "Secondly however, Kraus's criticism contains an indistinctness of conception. He speaks of the immutability of units of mass, without defining this term. He overlooks the fact that there are no means by which we can compare unities of mass, except, in fact, by physical phenomena. What does it mean that a metre is supposed to be just as long in one system as in the other? There is no possibility at all of utilizing this statement physically, outside of defining a metre by something physically real. It is determined in the simplest way by asserting that the

same stick should be called a metre, no matter where it happens to be. Other definitions, for instance by means of the wave-lengths of light, bear no essential difference to this definition. Every statement with respect to the magnitude of a velocity is therefore a statement about the relation of two physical objects, the object which is moved, and the object defined as the unit. It is greatly to the credit of Einstein that he has consciously referred all the physical readings to such relative numbers of actual things. His principle of light also is a statement with respect to such a relative number. Whether one then chooses to call the transposed unity change d—is a matter of taste."

Philipp Frank, who occupied the chair of theoretical physics in Prague after Einstein, discourses on this matter very interestingly: he compares the situation of the theory of relativity in the face of aprioristic philosophy, with the situation of the opinions linked to such names as Copernicus, Galilei and Kepler (heliocentric views) opposed to the geocentric opinions of the philosophers and the church of those times.

Philipp Frank says that in the famous lawsuit against Galilei, it was by no means a question of his swearing that he did not believe in the motion of the earth any longer; that which the clerical inquisition demanded from Galilei was only that he should confess that the doctrine of the earth's motion was only correct in the sense of a mathematical fiction, but was wrong as a "philosophic doctrine". In other words, Galilei was supposed to admit that the heliocentric interpretation was a mathematical fiction, but the geocentric one a philosophical truth.

As to why the church of that time felt itself threatened by the heliocentric interpretation, D i l t h e y orients us in "Der entwicklungsgeschichtliche Pantheismus" ("Development-historical Pantheism"): "In the statement appearing equally in Kepler, Galilei, and Descar-

tes, that it was foolish to believe that the goal of the universe lies in man, a complete transformation in the interpretation of the world is effected. While these thinkers were forced towards an immanent teleology, the expression of which is the harmony and beauty of the universe, the character of former Christian religiousness was changed."

Quite analogously, a transformation in the interpretation of the world is occurring in present times, due, in the first, place to the theory of relativity.

The representatives of the modern theories of physics in Berlin formed the "Gesellschaft für empirische Philosophie" ("Society for Empirical Philosophy"), which, together with the "Verein (Society) Ernst Mach" founded the periodical "Erkenntnis" ("Perception") in Vienna.

The old philosophy is often designated there as the "school-philosophy" while the new empirical philosophy is understood as the "scientific interpretation of the world".

As one can already see from the title, the duty of the empirical philosophy consists in its trying to utilize in a perception-theoretical manner the discoveries of natural science which have been made in recent times, in the investigation of old truths, and thus in the drawing of a boundary line between the scientific interpretation of the world and the old school-philosophy.

In order to characterize the contrast between these two philosophical tendencies, I shall, together with Philipp Frank, bring several quotations from the writings of the newer philosophers.

In Henri Bergson we read in his preface to the French translation of the book "Pragmatism" by William James:

"For the ancient philosophers there was, superior to time and space, a world in which from all eternity all sorts of truths were contained; according to them the judg-

ments of man were all the more true depending on how faithful an image they were of those eternal truths. The modern philosophers have, in fact, brought down truth from heaven to earth, but they still see in it something which exists before our judgments. A law such as "heat expands a body" would, according to them, be a law which is enthroned in their midst, if not above them, a law which is really contained in our experience; it only remains for us to draw it out of the latter. Even a philosophy like that of Kant, which assumes that every scientific truth is a truth only with respect to the human intellect, regards the true statements as given beforehand by human experience; if this general experience is once organized by human thought, the whole task of science consists in breaking through the restraining covering of facts in the inside of which truth lives like the kernel of a nut in its shell."

The empirical philosophy lays emphasis on the fact that the activity of the physicist consists solely in the comparison of occurrences with other occurrences in the sense of Ernst Mach, who taught that all the statements of physics are statements about the relation of sensory perceptions, statements about concrete events. All questions about the "essence" of force, matter, etc., lose their meaning.

We read further in Moritz Schlick:

"The idea of truth was formerly almost always defined as an agreement of thought with its objects . . ."

As, however, there can be no agreement in the sense of equality or similarity between a mental conclusion and the object judged by it, "the idea of agreement melts away before the rays of analysis, in so far as this idea is supposed to signify equality or similarity, and what remains of it in the end is the unequivocal co-ordination alone".

Accordingly, science and, in general, judgment consists of the unequivocal co-Ordination of

a system of symbols to **our** experience. Here the role of the mathematically logical method is displayed.

To give an example:

The symbols of the electro-magnetic phenomena are the field-strengths, charging densities, and constants of material. The formally mathematical relations between the symbols coordinated in this way are sought, which finally leads to the field-equations.

On the subject of Kant's "thing in itself", Moritz Schlick says the following:

"If one had known and remembered before, that perception consists in a mere co-ordination of symbols to objects, one would never have thought of asking whether perceiving the things as they are in themselves is possible. This problem could only be led up to by the opinion that perception was a sort of concrete form of imagining, which created images of the things in the consciousness; for only under this assumption one could ask whether the images displayed the same quality as the things themselves". Also Rudolf Carnap in his book "Der logische Aufbau der Welt" ("The Logical Structure of the World") treats perception from the standpoint of concrete events.

A scientific problem investigates the question whether a certain relation does or does not exist between certain events. Carnap proves that all statements in which objects are mentioned may be traced back to concrete events.

Finally, everything depends on testing whether there is a similarity (i. e. an analogy) between concrete events.

And here one recognizes the old standpoint of Ernst Mach.

One thinks in analogies. And if one now asks the question whether it will be possible to make all science uniform, whether, in other words, the scientific interpretation of

the world bears a uniform character, one will have to emphasize as Ernst Mach has already pointed out, that the characteristic of imperfection is attached to analogies.

In my opinion it is the case of a principle of inconstancy of thought which explains the discontinuity of experimental results. (On the subject of analogy in natural history and its incompleteness, information is offered to the reader in the first chapter of my book, prefaced by Einstein: "Grenzflächenvorgänge in der belebten und un belebten Natur" 'Limiting Surface Phenomena in Animate and Inanimate Nature', Leipzig 1930.)

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Let us still hold a brief discussion of the question as to whether Einstein's theory or its separate parts may be attacked from the standpoint of physics. To do this however, we must first make clear to ourselves what a theory aims at in general and what a theory is. A theory represents the uniform summary of experience, which offers us help also in those cases where the facts of experience show a gap.

With a minimum of hypotheses it must indicate a direction, if only a qualitative one, which links together as great a number of experienced facts as possible.

If, for instance, we should make the statement that the distortion of rays of light could have a different explanation, but that the perihelic motion of the planet Mercury could also have an explanation of its own, we should be able to reply at once, that the theory of relativity is already to be preferred for the reason that it represents both facts of experience from a single point of view, quite apart from the fact that it builds up the philosophical bases of physics on a firm ground.

These reasons are decisive for a theory. They remain decisive also when the separate parts of the theory receive only a qualitative instead of a quantitative confirmation

by experience. For new factors, such as side-effects, can, for instance, appear or a theory can after all possess an approximative character.

The more complicated the complex of experience, the more difficult the appearing factors are to control, the greater the deviations from the quantitative course of the natural phenomenon can be expected to be.

Such a deviation from the quantitative course is found, for instance, in the distortion of rays of light in the field of gravity, according to the last solar eclipse expedition to Sumatra in 1929, which was carried out by E. F r e u n d - l i c h, H a r a l d v o n K l u b e r, and A l b e r t v o n B r u n s. These research-workers arrived at the following result: "The result of the Potsdam measurements is the renewed, absolutely certain proof of the deflection of light as a phenomenon only affecting the neighbourhood of the sun. As the figures for light-deviation of a ray of light passing and just grazing the sun, we obtain not the value 1.75 arc-seconds predicted by the theory of relativity, but the value 2.2 arc-seconds so that a doubt of the correctness of this result is not possible and the theory of relativity is placed before the necessity of accounting for this new fact of experience by a correction of its field-equations."

As regards my own person, I incline to the assumption that It is the question of an error in measurement or calculation here, but in order to introduce the reader more thoroughly and in a purely essential manner into the quantitative deviations from the claims of a theory, I shall mention as examples, E i n s t e i n ' s theories in the field of the hypothesis of quanta, which possess only a qualitative value, but which are of a fundamental signifiacne for physical chemistry, and have opened up quite new horizons.

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Such types of energy as, for instance, thermal energy and electrical energy can be transported: by conduction

and by radiation; the energy of light can solely be transported by radiation.

For radiating energy, Planck had set up his famous law of radiation in 1900. According to this law the emitted energy is a function of the wave-length and of the absolute temperature; besides the formerly known constants, namely the velocity of light and the Boltzmann constant, the equation contains moreover a new constant, the so-called Planck action-quantum ( $h$ ); it has the dimension of "action" (i. e. energy x time). This constant represents the starting point of Planck's quantum theory.

This law, based on the quantum hypothesis, which received a brilliant confirmation by experience, says that the value of the "action" of a natural phenomenon bears a discontinuable character, i. e. that this value cannot be of any chosen magnitude, but can only be a whole-numbered multiple of the "action-quantum". This law then expresses the fact that emitted energy, just like matter, is atomized.

This statement becomes more intelligible when the action-quantum is replaced by the corresponding energy-value ( $=\epsilon$ ). This is made possible by the linking up of the values for the velocity of light ( $c$ ) and the wave-length ( $=\lambda$ ) occurring in the equation:  $c = \lambda \nu$  whereby  $\nu$  is the frequency, i. e. the number of oscillations during unity of time. Then:  $\epsilon = h\nu$ . An oscillator with the frequency  $\nu$  can not take in or give out any chosen amount of energy, but only a whole-numbered multiple of an "energy quantum".

Let it be noted that: energy is atomized, but the energy-quanta, dependent upon the frequency, can be of varying magnitude, while the action halways represents a universal constant.

To this law of radiation, more correctly to the quantum-hypothesis, Einstein has lent great prominence by his applications.

Here I make mention of Einstein's law of atomic heat and Einstein's law of photo chemical equivalents.

Atomic heat is the product of the atomic weight and the specific heat of a body (=the number of calories which must be applied to the body to raise its temperature by 1° Centigrade).

The rule of *Dulong and Petit* from the year 1818 (the atomic heat of solids is independent of the temperature, is constant, and amounts to approx. 6 calories per degree) already proved inadequate for *Diamant*. Later it was found that in the case of sufficiently low temperatures, the atomic heat decreases considerably with the temperature.

Einstein solved this problem by introducing the working hypothesis that the atoms of a solid are oscillators and that these oscillators are in an equilibrium of radiation with the energy content of the body. Planck's law of radiation could now be applied.

Although Einstein's law of atomic heat showed no quantitative agreement with experience, it led qualitatively to an understanding of the character of the phenomenon.

Planck's quantum hypothesis was brought into particularly great prominence when Einstein with its help developed the theory of absorption of light by quantum, which finally led to the law of photo-chemical equivalents.

Matter can only absorb whole-numbered multiple quanta and not fractions of  $h\nu$ . If it is the case of a photo-chemical reaction, i. e. of a chemical reaction which is caused by the absorption of light, thus representing the conversion of luminous energy into chemical energy, *Einstein* concluded that each absorbed energy quantum,  $h\nu$ , was equivalent to the exchange in an elementary chemical reaction.

The importance of this law for photo-chemistry cannot be ignored.

This law raises photo-chemistry to a science, just like

Faraday's law (—for the electro-chemical exchange of a gram equivalent of matter, an electric charge of 96,490 coulombs is necessary) represents the basis of electro-chemistry. But while in the case of Faraday's law it is the question of a reaction between an elementary particle of matter and an elementary charge of electricity, in Einstein's law of equivalents the exchange takes place between a light-absorbing molecule and the elementary amount of energy ( $h\nu$ ).

In order to understand this, one must remember that Einstein's law treats a field where the transport of energy is effected by conduction. Here the electrical energy may be understood in a simple manner as the product of the difference of potential (=driving force which moves the quantities of electricity along analogously to the moving along of the heat quantities in a conductor of heat by the difference in temperature) and the strength of the current, which represents the amount of electricity sent through per second. It is the question of this amount of electricity in Faraday's law.

We are not always able to realize, more correctly to follow, these two laws.

This difficulty may be very lucidly demonstrated in the case of Faraday's law. It would appear that according to Faraday's law, the amount of current passed could be measured in a simple way for instance by weighing the amount of metallic copper precipitated from an aqueous solution of copper sulphate by an electric current. Such a "copper-coulombmeter" is actually used in practical work but how difficult was its construction!

In the aqueous copper sulphate solution there are present besides the copper atoms each charged with an elementary charge of electricity (monovalent copper-ions), also copper atoms bearing a double charge (bivalent copper-ions). The electric current here gives rise to the following phenomena:

I. Conversion of the monovalent copper-ions into metallic copper.

2. Conversion of the bivalent copper-ions into metallic copper.

3. Conversion of the bivalent copper-ions into monovalent copper-ions.

4. A currentless separation of monovalent copper-ions into metallic copper and bivalent copper-ions.

It is not easy to follow all these phenomena quantitatively. And the reader will already understand wherein the difficulty lies: in order to realize Faraday's law (and analogously Einstein's law of equivalents), conditions must be chosen according to which it is a case of a *u n i f o r m, d i r e c t* transformation. Thus, for instance, after many trials, the copper-coulombmeter was so constructed that in 99-99% it was the case only of the conversion of bivalent copper-ions into metallic copper.

It will now be asked what significance is possessed by these two laws, which, by the way, are profoundly involved in the theoretical structure of our science, in the cases where they cannot be realized.

We thus approach the question of the general significance of the theory.

This theory gives us the general conception of the world, the guiding from the standpoint of which we can evaluate the experiments. It links the experiments together to make a whole, calls forth new problems, which give rise to new experiments, etc.

I present the following quotation from a fine essay by *M a x P l a n c k*: "Wissenschaft und Glaube" ("Science and Faith"), which appeared in a daily paper in December 1930: "Since the material (presented by experience) is always incomplete, it always consists of separate, if not also sometimes very numerous parts. This is true for the tables of measurement in the natural sciences, as well as for the do-

**cuments of the mental sciences. It must therefore be supplemented and completed by a filling up of the gaps, and this always happens only through combinations of ideas which spring not from the past but from the imagination of the research worker, whether one happens to designate it as a belief — or more carefully — as a working hypothesis. The essential fact is, that its content in some way exceeds that given by experience."**

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Ihrer gächter Herr Professor:

Ich glaube, dass die Ungleichheit der Konfessionen  
 ein sehr gering belanglos ist. Nur ist bei uns Juden die  
 Annahme einer anderen Konfession ein symbolischer Akt, das  
 heißt, dass man sich von seinem Volke los sagen will.  
 Konfessionslos kann man aber sehr wohl sein, ohne seinem  
 Volke entgegen zu sein (siehe meine Meinung unten), auch  
 ist die Konfessionslosigkeit nicht haltbar, für einen Mann

inwieweit wir Juden uns als <sup>1914</sup>Rasse oder als Nation betrachten  
 sollen, inwieweit wir nur durch Traditionen eine gesellschaftliche  
 Gemeinschaft bilden. darüber bin ich ja einem klaren Urteil  
 nicht gekommen. Es genügt, dass wir eine mehr oder weniger  
 deutliche von der übrigen Menschheit sind, abhebbare Volksgrenzen  
 bilden, dessen Realität von niemand beweifelt wird.

Es grüßt Sie freundlich  
 Ihr A. Einstein.



27. VIII. 23.

Ich kenne Herrn Dr. Reichenstein schon seit  
langer Zeit, sowohl persönlich als durch seine  
Abhandlungen. Es ist kein Zweifel, dass die experimen-  
tellem und theoretischen Arbeiten von Herrn Reichenstein  
hauptsächlich der Chemie und Physik der Grenzflächen zwischen  
festen und flüssigen bzw. gasförmigen Phasen neue Gesichts-  
punkte gebracht haben, von denen man einen erheblichen  
Beitrag zur Klärung dieses schwierigen Gebietes erwarten  
kann. Auch in einschlägigen technischen Problemen  
hat sich Herr Reichenstein seit Jahren betätigt.

Albert Einstein.

Einstein's expert opinion about the author from the year 1923.



Oxford, 26. I. 31.

Lieber Herr Reichsminister! (Kreuzschlager 22, 200  
ist dem auch im Herrn  
Reichsminister geschrieben)

Es freut mich sehr, daß Sie es kühn genug  
wagten. Für Sie collagen wir nicht so schwer arbeiten

können. Sie sind auf meine Sprache. Ich werde übermorgen  
nach Berlin reisen. Mein Wohlwollen haben Sie nicht  
verloren; Sie haben mich nur nun ein für meinen  
eigenen Arbeit notwendige Zeit kühn genug arbeiten.

Was nun den Artikel im Sunday express  
anlangt, so kann ich Ihnen nur sagen, dass ich  
nicht einen Artikel verfasst habe, nur eine von  
den Journalistengesellen in meiner Nähe gekommenen  
ist nicht einmal eine einzige Zeitung habe ich hier  
nur eine Augen bekommen. Wenn aber ein Artikel  
von ungeschickten Art erschienen ist, so ist es  
eine Fälschung. Solches ist schon oft vorgekommen.  
Mit den Zeitungen habe ich nicht Umgang dadurch  
abgefunden, dass ich es nicht lese, sondern  
daß wenn etwas daraus abgeht, was meine Tugend  
angibt. Damit bin ich glückselig zufrieden und  
bedenke die Methode für den Rest leben zu bleiben.

Es grüßt Sie freundlich

Herr F. Z.

Dießem Brief zu schickigen Zusammenhänge.



Oxford. 2. I. 32

Lieber Frau Reichlin-Melchior!

Der Brief wäre für mich nicht als ein interessantes psychologisches Dokument, wenn nicht das das Gefühl hingekörnt, dass ich Sie mit meinem Brief quälert habe. Das Interessante daran ist, dass Sie so gereizt waren, dass Sie nicht mehr imstande waren meinen Brief wirklich zu lesen. Jetzt sind Sie unbedenklich sicher ruhiger geworden. Ich sende Ihnen Ihren Brief zurück, damit Sie ihn mit dem meinen vergleichen können. Wenn Sie es so, wie wenn es sich um Vernehmprotokolle handelt, und erhalten Sie jede Gefühlsbeteiligung aus.

Ich sagte z. B. etwas in dem Sinne: die Schreibweise fiel mir weg, wenn es sich um eine Schmeicheleischrift handeln würde. Diese Bemerkung setzt doch voraus, dass man überzeugt ist, dass es sich nicht um eine Schmeicheleischrift handelt.

Ich machte nicht Ihnen das Vorwurf der Geschmacklosigkeit. Allgemein über unpfifflige ich es als geschmacklos, wenn über noch lebende Biographisches ~~unwissenschaftlich~~ ~~sonst~~ selbst oder autobiographisches publiziert wird. Ausgenommen sind nur solche Fälle, wo es sich um Darstellung von Tugendthaten oder irgend welchen thatlichen thaten handelt, die das Persönliche in den Hintergrund treten lassen. Ich habe auch verboten, dass das Reiser'sche Buch in deutscher Sprache erscheint und andererseits Ihnen erlaubt, Ihr Buch in fremden Sprachen erscheinen zu lassen.







