

Copenhagen 27.10.1928.

Dear Nishina,

Just a few lines accompanying the manuscripts, which I hope will reach you in time. I am just copying the formula in the copies for Z. f. Phys. Thank you for your kind letters. I hope that I have understood suggestions about changes properly. You can see how you like the passages I put in. If you write me before the proof comes I shall of course be glad to put in any change you might think desirable. The difficulty was the eigenfunctions in the presence of a magnetic field, a point which I think is not completely cleared up yet, though the form in which the degeneration of the free electron is now treated in the paper would seem to be unambiguous. Therefore the eigenfunctions you have used in your paper are not so simply as we thought connected with the "Spin", but this has no influence on your results, only the sentences where spin comes in could not have quite the definite form you gave them. Now you can see what you think about the whole thing.

And then I want to thank you for the time we have been together and send you the best wishes for your future. I need not tell you that we shall often miss you.

The kindest regards from all of us.

Yours Sincerely
Oskar Klein

P.S. Bohr sends you his kindest regards and asks me to tell you that it has occurred to him that you perhaps might wish that a document like that he sent you yesterday was addressed directly to the Director of your Institute or to somebody else. If so, would you perhaps let him know how it should be addressed and what changes in content or form you might suggest.

Copenhagen 2.12.1928

Dear Nishina,

Thank you for your kind letter with the manuscripts. The reason that I have been so slow in answering is that I wanted to send you proofs, which had arrived a little before your letter, in final shape. I hope that you will find that the changes agree with your suggestions. It was very helpful that you wrote down everything so carefully. The only important change was one found by Chr. Møller, who on Bohr's proposal went through all your calculations with the help of the papers you left with me. We thought that you would be glad for this since you could not yourself see the proof; and unfortunately I was too busy to do it. The change in question comes from that you had forgotten in using formula (7) of your paper for the calculation of the intensity of the doubly scattered radiation to take the change of frequency during the first scattering into account, a thing one would easily forget. As you will easily see, the effect of this is, that β in (7) has to be taken equal to $\alpha/(1+\alpha)$. The final formula, however, is not very different from your original formula, and all your general conclusions are valid. I agrees somewhat better with Lukirsky's measurements.

As to the spin difficulty it was this: In the paragraph about the eigenfunctions in the presence of a magnetic field, which I gave you to read a few days before you left Copenhagen, I had tried to prove, that these functions for arbitrary velocities were those where $\psi_1=0$ and $\psi_2=0$ respectively. That this is wrong would follow from our considerations in the country already, but in the meantime I had forgotten some of our conclusions - for instance that the solution in Bessel functions was only valid for $p_3=0$ - and only the last day I found the error in the argument. This had no very close connection with the difficulty regarding spin, which we had been discussing that

afternoon; It occurs to me now that you must have thought so, and that this may have made it difficult to you to see the point in question. I think that I came to reconsider the question partly due to our discussion partly due to some remarks of Bohr on the general problem of spin. Since for our purpose the possibility of actually "magnetizing" (or polarizing) electrons - a problem, which has proved to be rather difficult to solve, Bohr and the whole laboratory have been interested in it since that discussion on Oppenheimer's paper, which you took part in - was not immediately essential I have limited myself to try to give a proper treatment of the degeneration in question. The result is the new §.2 of the paper. I found this way of treating the degeneration rather convenient, since it gives a simple way of finding two independent eigenfunctions for each set of energy and momentum. There are, however, an infinite amount of other eigenfunctions, for instance our solutions $\psi_1=0$, $\psi_2=0$. But you must not forget that our argument for regarding them as proper eigenfunctions was that we believed that these, apart from the transition to Bessel functions, would be the eigenfunctions in the presence of a magnetic field. In fact, I did not feel certain that our intensity calculation was correct until I had derived all our $d\bar{d}$, $d\bar{s}$ etc. relations by means of the new functions, which I have called u^* , v^* . At present I am inclined to think that one could have been certain of it. But I do believe that the argumentation is easier when we make use of u^* , v^* . Another point, where I think there is some progress since you left, is the way of calculation indicated at the end of p.13. I rather believe that the whole intensity calculation would be quite a bit simplified if we tried to use this procedure from the very beginning, but I have not had time to look at this.

We are all very eager to hear from you soon, both about your experiences in America and about your arrival in Japan. It was very good news you sent about the interest for our work in Cambridge. I shall also write to you now and then, though writing letters is not my

strongest side. My wife is fortunately quite well again. She and all of us send you the kindest regards and many good wishes for Christmas and the year 1929.

Yours sincerely
Oskar Klein

P.S. 3.12.1928 Your Nature Note has just appeared. We intend to send a short note, where the mistake in the formula is corrected. As soon as it is written I shall send it to you, and you may even get time to have it changed. I don't know if what I have written in this letter about the spin question makes it clearer to you. I should be glad to come back to this point if you have still any doubts. When the discussions about spin going in the laboratory have led to more definite results I shall be glad to tell you about them.

Copenhagen 23.1.1929

Dear Nishina,

As I wrote to you, Møller found a small mistake in your calculations and unfortunately your Nature letter appeared just a little too soon to have it corrected. Bohr and I have been talking of a note to Nature where the result is put right and I send you a few lines just to show you what we have been thinking of. If you find they will do for the purpose we thought that time might be saved if you let us send them in. In that case you need only send a telegram (slow message) with the word "agree" to Bohr, Blegdamsvej, Copenhagen. We shall then keep the proof until we have a letter from you with your comments.

Our papers in Zs. f. Phys. have just appeared and I hope to have

reprints one of these days; then yours will be sent immediately to Tokio. It has been very nice through pretty post cards you have sent us to follow your long journey. I have just received the one from Tokio, and I am glad to hear that you are well at home. We had a very pleasant Christmas vacation, first in Aarhus and then in Sweden. I shall greet you from everybody.

Yours sincerely

O. Klein

In a letter to Nature (December 1, 1928) I have given a formula for the intensity of radiation scattered at right angles first by one and then of the change of pregnancy of the radiation during the first scattering. When this mistake, which has been kindly pointed out to me by Mr. Chr. Møller, is corrected the formula of the former letter is replaced by

$$I = \frac{e^8}{2 m^4 c^3 r'^2} \frac{I_0}{(1 + 2\alpha)^2} \left\{ \sin^2 \theta + \frac{\alpha^2 (2 + 4\alpha + 3\alpha^2)}{2(1 + \alpha)^2 (1 + 2\alpha)} \right\}$$

Due to this, the comparison with the measurements of Lukirsky comes out somewhat differently. Thus for $\theta = 0^\circ$ the intensity of 5.3% instead of 6.5% of the intensity at 90° , when the wavelength is assumed to be 0.085 \AA , and agreement with Lukirsky's result would be obtained with a wavelength of 0.13 \AA instead of 0.14 \AA .

Institute of Physical and Chemical Research
Tokio February 1929

Y. Nishina

Institute of Physical and
Chemical Research
Komagome, Hongo, Tokio
1. 4. 29

Dear Professor Hevesy,

It was with great delight and interest that I read your kind letter of the 18th November^{*} upon my arrival here through America at the end of December. Since then more than three months have gone without my having answered to you. Your letter as well as all other letters of my friends have been lying on my table during whole this time and I have had a very bad conscience. At last I have time to-day to write this letter to you. The reason why I have been unable to write is that I have had too much to do. Let me tell about it.

First of all I have had to deal with a good deal of family affairs which have accumulated during last eight years and the duty of which I have neglected to do. There is an endless chain to follow. Then I have had to fill up the gap both abstract and concrete, which has been formed between Japan and myself during my long absence, I have had to adjust myself to the new conditions of life. All these things have taken and are still taking an incredible time for me. Next thing on which I have had to spend a good amount of my time is the lectures I have had to give on current problems in physics. To prepare such lectures is one thing in itself, but to write them down in a complete form for publication is another thing which is not so easy. Last thing which has taken my time, has been a marriage question and its consequences. I have had to marry about 5 weeks ago. You will perhaps be surprised that such an important

* See Publication No. 17, "G. Hevesy - Y. Nishina, Correspondence 1928-1949", p.1.

affair of life has been carried out in such a short time. It is nearly impossible from Western view-point, I myself did not know at the time of my arrival that I should marry in such a short time. But each country and even each family has its own custom and tradition and I am after all a man who was born in Japan, and according to the advice of my family and friends, I decided to marry a sister of my intimate friend here and had the wedding on the 23rd Feb. At the same time I rented a small house in order to form my home. I have had to furnish and arrange this house, I have had the first experience of running a house. All these have taken whole my time. You will see why I have not written a line to you so long.

Tokio has changed very much since the great earthquake of 1923, so much in some places that I could not recognize them at all. As to my adjustment to the Japanese conditions in the daily life, it has been going on quite all right. It has not been so bad because I have a fairly elastic adaptability to new conditions. Owing to the above circumstances I have been unable to get into physics at all, but I hope to do so soon.

Takamine, and Sugiura work in this Institute. Takamine has been ill, but has recovered and will soon begin his work. Kimura is at the University here, we do not see each other very often, because I have been so busy; he seems to be all right and is continuing his work which he did in Copenhagen. Every time we meet, our conversation comes to you and your family whom we miss very much.

In your letter you wrote about the possible change of your position. How have you decided ? I can understand how difficult it must be for you to decide between two good alternatives, but it is good that you have two good ones and not two bad alternatives.

How are you and your family ? I heard that you have had a very

severe winter all over in Europe. I hope all of you are all right and are now enjoying the nice spring whether it may be in Freiburg or in Frankfurt a/M. We have now here about the same temperature as one has at the end of April in Copenhagen and in a fortnight we shall have cherry-blossoms in its full beauty. From now till the end of May, we have one of the best seasons of the year.

With kindest remembrances and best wishes to your
family and yourself

Yours Very Sincerely
Y. Nishina

Tokio, 22 Jan. '30

Dear Professor Bohr,

Thank you very much indeed for your kind letter of the 26th Dec.* which I received about a week ago. I quite understand that you had to postpone your journey for a year. We are, however, all looking forward very much indeed to the visit of Mrs. Bohr and yourself to our country in 1931, for which we shall make necessary preparations. If you want any information, please write to me. In case you further change your plan, please let me know.

April and May is the best time for a visit to Japan in the spring. The exact time of cherry-blossoms, of course, varies from year to year according to temperature. The Emperor gives a garden party to prominent

* See Publication No.20 "Y. Nishina's Correspondence with N. Bohr and Copenhageners, 1928-1949", p.16.

people in the spring and autumn. In the spring it takes place usually on about the 15th to 20th of April and this marks the end of cherry-blossoms in Tokyo, because the cherries in that garden are of the kind which blossoms late. I do not know whether you are interested to attend such a party; if you would like to do so, we shall be pleased to arrange it.

I thank you very much for a separate copy of your essays in the University "Aarsskript". I shall read them with a great interest as well as with a happy remembrance.

With kindest regards to all your family and yourself.

Yours Sincerely
Y. Nishina

Institute of Physical and Chemical
Research, Komagome, Hongo, Tokyo

23rd. August, 1930

Dear Professor Bohr,

I thank you so much for your kind and interesting letter of the 4th. inst.* I am sorry to hear that you had to postpone your visit to our country until the spring of 1932. We have been doing some preparation for your visit, but that does not matter if you come here

* See Publication No.20 "Y. Nishina's Correspondence with N. Bohr and Copenhageners, 1928-1949", p.17.

once at all; we are all so much looking forward to having Mrs. Bohr and yourself here in Japan in about one and half year's time. We have recently been talking much about your visit and have always wished that you would stay here more than a month. From your letter, however, I now see that you intend to spend just a month in Japan and I should like to know whether this plan of yours is flexible or not. We should be very pleased if you would stay longer in case you have time enough to do so. That would enable us to learn something substantial about the principles of atomic theory, the subject which we are most anxious to hear from you. We have of course nothing to offer you here in physics and you will perhaps get tired, but you might find something which interests you outside science.

I am much interested in Jacobsen's experiments on the scattering of hard radiation by various elements, as you wrote to me. I understand the importance of the question, and if the effects reported by German and English physicists are real, that will give us another implement to search with inside the nucleus. I am therefore looking forward to Jacobsen's results to see how large such effects are, although W.Kuhn's results seem to point to the smallness of such effects.

I am still being kept away by various external circumstances from getting into real physics and doing work of my own. I hope, however, that the conditions will soon improve and permit me to do some scientific work. At present I have to spend so much time for lecturing, colloquium, book-writing, etc. In this connexion, I miss the conversations which I always had with all people in your Institute. Please send my best remembrances to all of them, especially to Klein, Jacobsen and Miss Schultz.

Last April a boy was born to us, his name is ^{Yu iti ro} 雄一郎 and is getting on quite all right.

My wife joins me in sending our best regards to Mrs. Bohr, all your family and yourself.

Yours Very Sincerely
Y. Nishina

P.S. I should be very much obliged to you if you would let me know in case you make further changes in the plan of your journey in future.

Tokio, 24. 4. 1931

Dear Professor Bohr,

I should like just to inform you, although you might know already that Professor Nagaoka will leave here in a week's time for Copenhagen, where he is going to attend a radio meeting, I was told. I hope that you will have an opportunity of talking with him about your visit to Japan. He has just been appointed the first President of Osaka University which will be opened on the 1st of May.

How are you and your family ? and how is the life in the Insitute ? I am very pleased to hear from Miss Schultz that the ten year's anniversary of the Institute was very pleasantly celebrated by the presence of a great many of Copenhagener school.

Professor and Mrs. Hevesy visited Japan on their way home from America and stayed about three weeks, of which they spent about ten days in Tokio and its neighbourhood. I hope they enjoyed the stay which seemed to me too short.

I am quite all right in health, but have very little time for scientific work. In a week's time I shall have to go to Kyoto to give lectures in the Physics Institute of the University. I shall stay there three weeks, that will again prevent me from doing my own work.

Professor Takamine will soon come to Europe from America, I was told; I do not know if he will come to Copenhagen. He intends to stay at Utrecht for some time.

With best regards to your family and yourself

Yours Very Sincerely
Y. Nishina

Tokio, 4-7-35

Dear Bohr

Dirac has been here already two weeks and we are enjoying his stay very much.
And so is he.

We are all expecting you here in 1937 and
are hoping Heisenberg will come with you.

Honourable greetings from

Y. Nishina
P.A.M. Dirac

* underlined words: written by Dirac



Post Card

CORRESPONDENCE

Tokio, 4-7-35

Dear Bohr,

Dirac has been here already two weeks and we are enjoying his stay very much. And so is he.

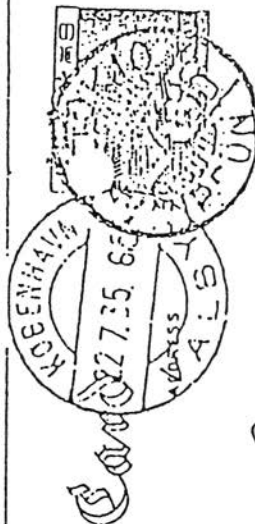
We are all expecting you here in 1937 and are hoping Heisenberg will come with you.

Honorable greetings from

Y. Nishina

P.A.M. Dirac

THE GREATEST VIEW OF MT. FUJI
FROM THE LAKE SHODJI
THE FINE LAKE OF MT. FUJI



Prof. N. Bohr

Tokio

27.35.65
N. Bohr
Copenhagen

Denmark

via Siberia

The Institute of Physical and
Chemical Research.
Komagome, Hongo, Tokyo

Tokyo, May 28, 1937

Dear Bohr,

I knew already at the time of your arrival in Yokohama that you had to leave us in five weeks' time, nevertheless I was awfully sorry when the time came to see all of you off at Nagasaki. My sorrow was only mitigated by the hope that we shall meet in not a distant future.

I thank you for your very kind post-card, which you sent me from the steamer.* When I learned from it that you had a nice voyage, I felt much relieved, because during that night we had a strong wind, the rattling of which awoke me in bed of the hotel at Hakata. After visiting my native place, I came back here in Tokyo a few days ago. Everything reminds me of delightful, impressive and busy days I have had with you and your family. It is needless to say how grateful all of us are for your visit to this country. Personally I have now much to think over what you told me during your stay, which has given me so much encouragement, consolation, and strength in my life.

I am now waiting for your cable about your itinerary through Manchukuo, so that we can inform the authorities concerned to take care of your journey. Lieut.-General Hatano of Japan Society for the Promotion of Scientific Research and the President Nagayo of the Tokyo Imperial University have already written to them about the matter but the dates of your arrival given were not certain.

All your wood boxes have been safely sent to Yokohama and if things have gone smoothly, they will be on board the Danish steamer which is

* See Publication No.20 "Y. Nishina's Correspondence with N. Bohr and Copenhageners, 1928-1949", p.60.

expected to leave Yokohama to-day. I hope that everything will arrive in Copenhagen in good conditions.

Professor Tanabe, the philosopher in Kyoto, answered to me regarding the criticism which appeared in the Kyoto news paper. In his opinion it is unnecessary to answer to those articles seriously, because they have no points of their own except antipathy and they will therefore never be reasoned to agree. I quite agree with him and I think we need not bother about it any more.

I hope you have had a pleasant and interesting journey in China and nothing has gone wrong with you all. I wish I could travel with you. I really hope that you all will have a nice journey also through Manchukuo as well as Siberia and safely back to Copenhagen.

Please send my best remembrances to your family at home as well as Hevesys, Miss Schultz and all those in your Institute, and also to Kapitza and Kleins on the way.

With heartiest remembrances and best wishes to your wife, Hans, and yourself from my wife, children, and

Yours ever

Y. Nishina

P.S. Please add the following persons to the list of those who did much for your decoration:

Professor H. Nagaoka,
Institute of Physical and Chemical Research,
Komagome, Hongo, Tokyo.

Lieutenant-General S. Hatano,
Japan Society for the Promotion of Scientific
Research,
Monbusho, Toranomom, Kojimachi, Tokyo.

To-day I have sent to your home the copies of Professor Nagaoka's addresses and the explanations for the doll presented to you by the Imperial University of Osaka.

Universitetets Institut
for Teoretisk Fysik

Blegdamsvej 15, København Ø
July 3rd, 1937

Dear Dr. Nishina,

I herewith acknowledge the receipt of the Kr.112,07 which were the rest of the expenditures in connection with the heavy water.* At the same time I send the acknowledgement from Norsk Hydro-Elektrisk Kvælstofaktieselskab.

It was a great pleasure through Prof. and Mrs. Bohr to hear that you are probably coming to Copenhagen again before too long. It shall be very nice to see you again. Both Prof. and Mrs. Bohr and Hans are most delighted over their stay in Japan and I am looking forward very much to see all the pictures they have taken.

With kindest regards,

Yours sincerely,
Betty Schultz

* See Publication No.17, "G. Hervesy - Y. Nishina, Correspondence 1928-1949", p.18.

Lynghuset, Tibirkelunde pr.Tisvildeleje.

Universitetets Institut
for Teoretisk Fysik

Blegdamsvej 15, København Ø
August 3rd, 1937

Dear Nishina,

After a few weeks of very busy days since the return from our long journey, we are now quietly settled here in Tisvilde together with the children, whom we were happy to find all in good health. Every day we speak about our wonderful experiences in Japan and send you and all our other faithful friends many grateful thoughts. We can never forget the marvellous beauty and enchantment of your country and it is often to us as if we still were travelling with you and Takamine, Kimura, Sugiura, Fukuda, Hori and Aoyama to Matsushima, Nikko, Hakone, Miyazima and Unzen; or that we were standing with you admiring the purity and beauty of the palaces in Kyoto or being deeply moved by the solemn dignity of the temples in Kamakura, Sendai and Nara.

The whole is a picture in our mind of beauties untold and happiness among real friends and to the complete harmony of it all your untiring care was of course the last clue. One of the most treasured pictures in our mind will always be the delightful hours in your home, where your wife played so beautifully on her old instrument and where your small boys were sitting each on his cushion with his little tray with the delicious Japanese meal before him. We also often see our friends - to whom we now always will reckon the kind and true Kuwaki - at the quay of Nagasaki, when the serpentine was gradually breaking, but where we felt that so many deeper cords were uniting us for ever.

How kindly you were still taking care of us, we felt all the time in China from your telegrams and from the arrangements made for us in Manchoukuo, where all officials were most kind to us, and where we had a

most pleasant and comfortable journey. Also in China we had a most interesting and delightful time. We saw most beautiful places like Peiping and Hangchow full of marvellous historical monuments, and we met everywhere with very great kindness from the Chinese scientists who are making great efforts in creating conditions for research work and were very eager to enter into international scientific cooperation.

It has been a wonderful experience indeed to us to get to know the old countries so far away, and not least I shall be happy if my journey will result in the strengthening of our old connection with the physicists in Japan. As I promise, I shall take care that all our work and discussions which may be helpful in this respect will be sent to you. In a few days Mrs. Schultz, who wishes to be very kindly remembered to you, will send you a copy of the manuscript of a little note which will soon appear in "Science" and the appearance of a Japanese edition of which in some semi-popular journal, as we spoke of, may be a remembrance of my visit and lectures in Japan which I shall appreciate very much. Besides I got some days ago a very nice letter from Hori, who kindly proposes together with his brother to make a Japanese translation of my little book "Atomic Theory and the Description of Nature". As I am writing to him by the same post, I shall of course welcome such a translation with very great pleasure, but as we had already touched upon this question, I have asked him to confer with you about the whole matter.

Above all, however, the whole family and everyone in the Institute are looking forward with the greatest pleasure to your visit here, and as soon as I have seen the directors of the Rockefeller Foundation, I hope in September, and with them have discussed the various problems we spoke about, I shall write to you in detail. When we come to Copenhagen again in a few weeks' time I shall also send you and all our other friends the promised photographs and write the more official letters of thanks to the Marquis Maeda and the presidents of the institutes and

universities. At that time I also hope that the boxes have well arrived with the many precious gifts, which we look forward so much to have in our home, and which the children are very eager to see.

With our kindest regards and very best wishes to yourself and your wife and children as well as all other common friends in Japan.

Yours ever,
Niels Bohr

The Institute of Physical and
Chemical Research.
Komagome, Hongo, Tokyo

Tokyo, August 28, 1937

Dear Bohr,

I thank you very much indeed for your very nice and touching letter which I received a few days ago together with the manuscript of your note on "Transmutations of Atomic Nuclei".

In my opinion your visit to Japan will stand as a land-mark in the progress not only of physics and related sciences but also of philosophy, genetics, and biology in this country. I do not know how many scientists here share this opinion with me but I am sure that at least those who have come into close contact with you and have understood your views will quite agree with me. In fact I have heard the similar opinions expressed on some occasions. In any case your visit has been and will remain a great encouragement and enlightenment for my own scientific life. I often think of various things which you told me and this gives me life and courage to push on through difficulties and depressions.

Anyhow it is a great pleasure and satisfaction for me to see that the old connecting ties between you and our physicists were ever strengthened through your visit, especially through family contacts. For us, who have worked in your Institute, it was a great joy to have an opportunity of having everyone's share in doing anything for you in return to what you have done for us in Copenhagen.

I am very pleased to hear that you are back all in good health to your home. Ever since you left here, we have been always talking about the days of your stay here and sending you our thoughts. It was really an unforgetful remembrance for us all. When we meet, our conversation recurs to the experiences we have had with you on various occasions.

In this connection it was very fortunate that you came here just in good time. It would probably be impossible for you to travel China at this time, because as you know bitter fightings are going on between Japan and China. It is most unfortunate to have such a situation in the Orient. I hope the peace will soon be restored but at present nobody knows how long it will take. If it will not be finished before long, it is possible that we cannot get sufficient fund for scientific research and that would substantially retard our progress.

Regarding the Japanese edition of your "Science" note, "Transmutations of Atomic Nuclei", I shall take care of it to be translated into Japanese and published in the October number of a semi-popular scientific journal "Kwagaku" which is a Japanese word for science. I shall look after the translation.

As regards your note "Kausalität und Komplementarität" published in the "Erkenntnis", I have spoken with our publisher as well as several persons who are interested in the matter. We have come to the conclusion that if you agree, the translations of this note and "Light and Life" should be published together in a pamphlet form. They also

propose that the Japanese edition of "Transmutations of Atomic Nuclei" and the translation of your "Nature" note, "Neutron Capture and Nuclear Constitution" should also be published together in a pamphlet form. These two pamphlets would make a very good remembrance of your visit to this country. They want me to take care all of the translations. In that case I shall consult with some workers in our Institute and especially in connection with the philosophical papers I shall consult with Prof. Kuwaki and some other people. Please let me know your opinion about this proposal.

With respect to your book "Atomic Theory and the Description of Nature", I informed our publisher of your opinion which you told me at Unzen. They are of course very anxious to publish the translation and desire that the theoretical workers in my laboratory would take care of the translation under my supervision, as was done with Dirac's book. I was just going to ask your opinion about the matter, but now I see from your letter that Hori would like also to translate the book. I shall soon get into communication with him and after settling the matter satisfactorily, I shall let you know and ask your opinion.

I thank you very much for your kind attention towards the realisation of my visit to Copenhagen through the aid of the Rockefeller Foundation. I should of course be very happy, if I could come to Copenhagen again and see your family and old friends in the Institute. After hearing from you the results of your conversation with the directors of Rockefeller Foundation, I shall make up my mind.

After you left Japan, we have been improving our cyclotron and we get at present 3 to 4 microamperes at 2.9 MV, which is limited by the saturation of our magnet. We are trying to increase the current but have not succeeded yet. Our medical colleagues have been studying the biological effects of neutrons and have obtained some interesting

results. We sent a note to "Nature", a copy of which I am sending you by a separate post.

Another thing which may interest you is the study of cosmic ray particles. As I told you on the occasion of discussions at the University of Osaka, we have been studying by means of a large Wilson cloud chamber the energy loss of cosmic ray particles in passing through lead. In the course of the experiments, we found that there exist particles which at higher energies radiate less than electrons and at lower energies ionise less than protons. This could most naturally be explained in our opinion by assuming the existence of particles, the mass of which is larger than that of the electron and smaller than that of the proton, although this is not the unique solution. The same conclusion had also been given by Neddermeyer and Anderson, by Street and Stevenson, and by Crussard and Leprince-Ringuet. We are at present trying to obtain more exact value of the mass of the particle. I am sending you a copy of our letter to the Editor of the Physical Review.

I should like to ask you to send me, if possible, two extra copies of your photograph with your signature. We should like to send one of them to the family Yamada, in which Mrs. Bohr saw flower arrangements, and the other to the doctor who examined your throat.

I hope all the boxes by this time have arrived in good conditions. Have you received your colour films developed all right ? I hope they have nicely come out.

With kindest regards and best wishes from us all to yourself, your wife and all your family as well as all in the Institute.

Yours ever

Y. Nishina

The Institute of Physical and
Chemical Research.
Komagome, Hongo, Tokyo

Tokyo, August 28, 1937

Dear Miss Schultz,

I thank you very much indeed for your kind letter of the 3rd. July together with the receipt for heavy water, which I received some time ago. I must apologize you for my negligence in correspondence. You have been so kind and have written to me now and then to let me know the various happenings in the Institute. I have been immensely interested in your letter but am sorry to have not answered to you. Hereafter I shall take care not to fall into such a negligence.

I thank you very much for the great trouble you have taken in connection with heavy water. We are very pleased to have it here and are using it everyday.

We have had a very nice time when Professor, Mrs. Bohr and Hans were here. I suppose you have heard their experiences and by this time you have also seen pictures they have taken here.

How are you now ? We are all keeping well. It is a happy thought for me to be able probably to come to Copenhagen some time and to see you and old friends again in the Institute.

With kindest remembrances and best wishes

Yours sincerely
Y. Nishina

Tokyo, Oct.3, 1937

Dear Bohr,

I must heartily apologize you that I have caused you and your Institute such an unpleasant trouble in connexion with the heavy water from Hydro-Elektrisk Kvaelstofaktieselskab.* I regret very much to have committed such a serious mistake. I am very grateful to you that you have settled the matter in such a graceful manner. We have had no enquiries either from "Hydro-Elektrisk" or from Japanese agent of the firm and I presume that the people of the agent are now satisfied with the correspondence they had with the Norwegian firm. I think this solution is entirely due to your endeavour for which I sincerely thank you. Every day we are using the heavy water for cyclotron and it appears now to all of us to be much more precious than it used to be before.

The translation of your "Science" note has just been published. I told the publisher to send you a copy of the journal. Some separate copies of the note will also be later sent to you.

I found that there is a difference between the note published in "Science" and the manuscript you have sent to me. One sentence

"The above considerations can therefore be applied in this simple form only when the change in the temperature in going from the second to the third stage in Fig.3 is comparatively small."

at the end of the second paragraph on page 164 of "Science" is missing

* See Publication No. 17 "G. Hevesy - Y. Nishina, Correspondence 1928-1949," p.21.

in the corresponding paragraph on page 6 of the manuscript which you sent to me. I should like to know whether or not it was deliberately left out. In my translation I added it; I can of course publish correction if necessary.

I saw your lecture announcement in the programme of the "Réunion Internationale de Physique, Chemie & Biologie" at Paris. Were there any interesting discussions ?

I hope you and all your family are in good health. We are all getting on all right.

With best wishes and kindest remembrances from us all to yourself, Mrs. Bohr and your family,

Yours ever,
Y. Nishina

Tokyo, June 15, 1940.

Dear Professor Bohr,

I am very sorry that I have not written to you for such a long time, during which great changes have taken place all over the world. I am very anxious to know whether you, your family and your Institute are getting on all right. This has been a matter of greatest concern for me.

I have been ill for some time but I think I am all right now. In spite of the war between Japan and China, we have been able so far to

pursue our scientific work without much hindrances. The operation of our 200 ton cyclotron is not yet in right conditions, but I hope that will soon be brought in order.

I should like very much to hear from you indeed and I send you and your family our best wishes for the time being.

Yours ever

Y, Nishina

Post Card

Kamakura, 17/VII, 1941

Dear Hevesy,

Our old friend Rosseland has suddenly appeared here with his family, we are enjoying their stay immensely, which is really too short.

I have been trying to get in touch with the authority in Denmark in connexion with your transit visa, but the war between Germany and Russia made everything in vain. With best wishes to your family and yourself.

Y. Nishina

I hope you & Mrs. Hevesy are very well. I just returned from America after 1 1/2 year's stay in Pasadena & Berkeley. It was really an unexpected pleasure to have Rosselands visiting Tokyo.

I certainly wish you & Mrs. Hevesy should visit us again.

Yours, T. Takamine

We have had the happiest time in Japan, and expect to arrive in California by 1/VIII. This is a delightful occasion to send you and Mrs. Hevesy our heartiest greetings.

Yours ever
S. Rosseland

May I join in sending you greetings and good wishes.

Ragna Rosseland

I am longing to see you.

Suma Takamine

2 Poelgeesterweg, Oegstgeest (Leiden)

10 July '49

Dear Nishina,

Just a word to tell you how glad I was to see your name, as vice-president for natural sciences, on the letter announcing the formation of the Science Council of Japan. It was sent to me, since I am at present the President of the International Union of Pure & Applied Physics. Secretary is the Professor Pierre Fleury, Institut d'Optique, 3 Boulevard Pasteur, Paris XV; his energy has made it possible, that the Union is very much alive, in these years. We get grants from UNESCO,

for paying the voyages of foreign physicists, who attend the many Congresses which we have held and are holding in these years in Europe. In Basel, 5-9 Sept.'49, there will be an international conference on nuclear physics, the week after a similar one on cosmic rays in Como (Italy). Although Germany is not yet an official member, some Germans have been invited too. Unfortunately, our means are small, otherwise we would have been glad to invite a Japanese physicist, in particular you, too. The Swiss Physical Society, would certainly have been glad to welcome you in Basel. I suppose the Japanese have hardly the money now, to send delegates or a delegate to Europe ? If there were a possibility, it would be wonderful to see you again, and I would take the question up with Prof. P. Huber, who organises the Congress in Basel.

How are you and your family ? And can you experiment again, in a way, after all the disasters of the war ? It would be good to have news from you. In an indirect way, we have heard a good deal about the interim work on physics in Japan, mainly through your journal. Mr. Araki sent me several interesting reprints on things I have been working too in old times.

How are our old friend Takamine & Mrs. Takamine, and Mr. Sugiura, who also were at Copenhagen ?

Mrs. Kramers and myself and our 4 children are all right, although I myself have been severely ill in '47, and have not yet got back the old energy.

With our most cordial regards

Yours sincerely

H. A. Kramers

Professor H. A. Kramers
2 Poelgeesterweg, Oegstgest,
Holland

August 27, 1949

Dear Kramers:

Thank you for your nice letter which I was so pleased to read after such a long interval of isolation.

I should like to tell you that I am coming to Copenhagen to attend the general meeting of the International Council of Scientific Unions to be held on September 14 - 16. I wonder if we can meet there, it would be very fine.

Dr. Stratton wrote to GHQ in Tokyo and asked whether Japan can send a delegate to the meeting, and if it is agreed, the possibility for external financial aid will be explored. Thereupon GHQ replied in the affirmative. But lately Stratton sent a telegram to GHQ informing that the financial means could not be obtained. Meanwhile GHQ decided to bear the expense and I shall leave here on September 8 and arrive in Copenhagen on September 13 via London by B.O.A.C plane.

I am sorry that I can attend neither Basel nor Como Conference. For such an attendance a formal inquiry to GHQ is necessary and now it is too late.

I shall leave Copenhagen on September 22 or earlier if I go to Paris for UNESCO meeting and arrive back in Tokyo on September 27.

Please send my best regards to Mrs. Kramers and your family.

With best wishes,
Dr. Yoshio Nishina

Appendix

Letters from N. Bohr to H.C. Kelly, D.W. Bronk and E.O. Lawrence after Y. Nishina's visit to Copenhagen, and their replies to N. Bohr (See Publication No.20 "Y. Nishina's Correspondence with N. Bohr and Copenhageners, 1928-1949", pp.65-70.)

September 22, 1949

Dear Dr. Kelly,

I am writing to tell how happy we have been here in Copenhagen for the visit of Dr. Nishina who, as you know, worked for years in this Institute, where he won the warmest friendship of all of us. We were deeply impressed by his truly human attitude which together with his high scientific qualifications and untiring zeal should make his activity most valuable in the great and difficult task of restoring conditions in his country. His stay here was an extreme pleasure to us all, and we hope also an encouragement to himself, and we are deeply grateful to you for facilitating his journey to Denmark. I understand that also a journey to U.S.A. of a group of distinguished scientists including Nishina has been planned and I am sure that such a visit will have the greatest effect in promoting cooperation in the proper spirit. From American delegates to the meeting of the International Council of Scientific Unions, which Nishina attended here, I also learned that the visit will be most heartily welcomed in scientific circles in U.S.A. With the same post I am writing to the Secretary of the National Academy of Sciences in Washington, Dr. Bronk, who is a personal friend of mine,

to express my pleasure in hearing about this plan and my hope that it will soon be realized.

Yours sincerely,
Niels Bohr

Dr. Harry C. Kelly,
ESS/ST, GHQ, SCAP,
APO 500,
Tokyo, Japan

September 22, 1949

Dear Dr. Bronk,

I am writing to tell that in these days we have had the great pleasure of a visit of Dr. Nishina from Japan who, as you may know, worked for several years in this Institute and won the warmest friendship of us all. We were deeply impressed by his truly human attitude and it was most interesting to learn about the conditions for scientific work in Japan and again to establish such contact of which we all in the earlier days profited so largely. Dr. Nishina came to attend a meeting of the International Council of Scientific Unions and his journey was arranged by the kind assistance of Dr. H.C. Kelly, who is scientific advisor to the American occupation authorities, and by Dr. Fraser, who is liaison officer between UNESCO and the International Council. From Nishina I heard that there is a possibility that he and a few other distinguished Japanese scientists may come to U.S.A. in a near future on the initiative of the National Academy of Sciences and I am sure that the contemplated visit will not only be a great and encouraging experience to the Japanese scientists, but will also be a great help to promoting co-operation in the proper spirit. As I

understood, however, it might be of help for the arrangement of permits etc. if at early convenience a formal invitation from the Academy was sent to the Japanese scientists concerned, and I thought therefore that I ought to mention this to you.

I often think of our talks in Philadelphia and Washington, and my wife and I remember with great pleasure our visit to your home in the forest. We both send you and your family our kindest regards.

Yours very sincerely,
Niels Bohr

Dr. D.W. Bronk,
Foreign Secretary,
National Academy of Sciences,
2101 Constitution Avenue,
Washington 25, D.C.

September 22, 1949

Dear Lawrence,

It was a very great pleasure to have a short visit of McMillan who told us about the latest progress of the wonderful research in Berkeley. At the same time as McMillan was here we had a visit of Nishina, whom we were so happy to see again after the long years of separation. Nishina told us about a contemplated visit to U.S.A. of a group of distinguished scientists including himself. On the advice of McMillan who knew how much you would welcome to see Nishina in Berkeley I enclose for your information a copy of a letter I am sending Bronk in case you yourself

should want to communicate with him about the matter.

With the kindest regards and best wishes from home to home,

Yours,

Niels Bohr

Professor Ernest O. Lawrence,
Radiation Laboratory,
University of California,
Berkeley, Ca.

October 3, 1949

Professor Niels Bohr
Universitetets Institut for Teoretisk Fysik
Blegdamsvej 15
Copenhagen, Denmark

Dear Professor Bohr,

I was, needless to say, very glad to get your letter and to know that plans are afoot to bring Nishina to the United States. McMillan discussed the matter with me and I telephoned Bronk to inquire what is being done and whether there was anything I could do. Bronk indicated that he was actively working on the arrangements and so I gather there is an excellent chance that we will have the pleasure of seeing Nishina over here sometime this winter. All of us here would be pleased beyond words if Nishina could spend some time with us in Berkeley.

McMillan told me about his visit with you and I was especially glad

to hear that everything is going very well indeed with you and yours in Copenhagen.

Molly and I send you and Mrs. Bohr our warmest greetings.

Sincerely,

Ernest O. Lawrence

EOL:EI

19 October 1949

Professor Niels Bohr
Universitetes Institut for Teoretisk Fysik
Blegdamsvej 15
Copenhagen, Denmark

My dear Professor Bohr:

Thank you so much for writing me concerning Dr. Nishina and possible arrangements for his visit to the United States.

I have been much interested in the proposed mission of Professor Nishina and several of his colleagues. The National Academy of Sciences will be glad to sponsor their visit, and the only matter which remains is that of securing the financial means for their journey and visit. I have at last received definite assurance that such funds could be made available through the organization of which Dr. H. C. Kelly is a member. Accordingly, I have again telegraphed to Dr. Kelly and written to him asking him to explore the possibilities of securing these funds and to let me know promptly, so that we can advise Professor Nishina and thus avoid the necessity for his returning to Japan before coming to the

States. Perhaps you could arrange to keep Nishina with you a little longer until I secure definite information. Just as soon as I have such information I will let you know.

It seems impossible that three years have gone since we had the very pleasant visit from you and your wife and our other guests of the National Academy of Sciences. I do hope that you will both be coming over again soon, for I regret that I did not have more than a glimpse of you when you were here a year ago.

With every good wish to you both from Mrs. Bronk and me, I am

Yours sincerely,

Detlev W. Bronk

Foreign Secretary

DWG rg

General Headquarters
Supreme Commander for the Allied Powers
Economic and Scientific Section
Scientific and Technical Division
APO 500

Dr. Niels Bohr
Universitetets Institut for Teoretisk Fysik
Blegdamsvej 15
Copenhagen, Denmark

19 October 1949

Dear Dr. Bohr:

Your kind letter regarding the visit of Dr. Nishina is deeply

appreciated. We completely share in your view of Dr.Nishina, for he is doing a superb job both for the economic recovery of Japan and the development of international understanding.

With the greatest respect for your leadership in promoting cooperation and understanding, I am

Sincerely yours,
Harry C. Kelly

Corrigenda

Publication No.17. "G. Hevesy - Y. Nishina, Correspondence 1928 -1949"

p.24, l. 6: Cyklotron → Cyclotron
p.27(cover), l.11: (Post Card) → (Postscript)

Publication No. 20 "Y. Nishina's Correspondence with N. Bohr and Copenhageners 1928-1949"

p.3, l.17: F lledparken → Fællledparken
p.19, l.17 from the bottom: Nord Jylland → Nord Sjælland
p.22, l. 8: I so often written → I have so often written
p.29, l.11: waiting to see → waiting so long to see

Supplement to the Publications No.17, 20, 21

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