Interview with Bartel Leendert van der Waerden

Yvonne Dold-Samplonius

Dold: Professor van der Waerden, how did your interest in mathematics begin? What are your first memories hereof?

van der Waerden: My father was a teacher of mathematics; thus, in our house there were books in this discipline. He absolutely did not want me to study these; he maintained that I should play outside rather than dedicate myself to mathematics books. So he locked up the books, and I could not have access to them. That stimulated me at times. For example, I rediscovered all of trigonometry, starting from the law of cosines. I knew, somehow, what the cosine means. I also knew the law of cosines. From my investigations emerged an expression which I called "the square root of one minus the cosine squared". Then my father helped me, telling me this was called the "sine". At that time I was a student at the Hogere Burger School (HBS) of Amsterdam, the city where I was born February 2, 1903—a school following elementary school, which lasted five years. Geometry was the object of study, but not trigonometry; that would be taught in the later classes.

Dold: Could you tell us some other "mathematical" experiences of that period?

van der Waerden: I had a game called "Pythagoras". It consisted of pieces which could be moved around freely and with which it was possible to construct a square or a rectangle or a triangle by combining them in a variety of ways. I received it as a present, and I played with it most happily. Almost always I played alone or with my father. My two brothers were not at all interested in this type of game.

Dold: Was your mother interested in mathematics?

van der Waerden: No, I think not. I loved my mother very much. Often we went by boat to Zaandam, where she had relatives. I always liked very much to go to Zaandam. These relatives also had a sailboat, and we often went sailing there.

Dold: What happened after HBS?

van der Waerden: After HBS I continued to study. Naturally, according to the experts, I should become a mathematician. However, I do not remember any particular mathematics teacher. But at school I did have an ex-

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cellent physics teacher who knew the theory and ran experiments for us. But I remained faithful to math.

Dold: Under whom did you study at the University of Amsterdam?

van der Waerden: At that time there was Brouwer, who was the most famous, and Weitzenböck, who taught invariance theory—he wrote a book about it. But I learned the most from Mannoury, the mathematician who introduced Holland to topology. Mannoury was a communist and also an original mathematician.

Dold: Did you have nonprofessional interactions with these people?

van der Waerden: Mannoury was a friend of my father, who was a Social Democrat but of the left. When the communists separated from the Social Democrats, my father felt close to the communists; he had many friends, many of whom were communists. But he was a democrat and thus remained in the SDAP.

Camilla and Bartel van der Waerden, Seattle 1949.

Dold: Did you have close contacts with Brouwer?

van der Waerden: No, Brouwer came to give his courses but lived in Laren. He came only once a week. In general that would not have been permitted—he should have lived in Amsterdam—but for him an exception was made.

Camilla van der Waerden: You should tell the story of when he asked you to be quiet.

van der Waerden: Oh, yes. Once I interrupted him during a lecture to ask a question. Before the next week's lesson, his assistant came to me to say that Brouwer did not want questions put to him in class. He just didn't want them; he was always looking at the blackboard, never toward the students.

Dold: Thus it seems he wasn't very good at exposition; however, did you learn much from him?

van der Waerden: No. Even though his most important research contributions were in topology, Brouwer never gave courses in topology, but always on—and only on—the foundations of his intuitionism. It seemed that he was no longer convinced of his results in topology because they were not correct from the point of view of intuitionism, and he judged everything he had done before, his greatest output, false according to his philosophy. He was a very strange person, crazy in love with his philosophy.

Dold: You have also worked in topology.

van der Waerden: Yes, I learned a little topology from Mannoury. He wrote a beautiful paper, "Surfaces Images". He was an original person.

Dold: Then how did your studies proceed?

Camilla van der Waerden: He did his military service in the middle of them.

Dold: Were you required to do your military service before finishing your studies?

van der Waerden: No. I had terminated them, but I hadn't yet graduated. I had already finished all the necessary exams. Military service was put off until after the final exam.

Dold: Did you take the final exam with Brouwer, Mannoury, and Weitzenböck?

van der Waerden: No, with de Vries; de Vries also was a very original person. He gave a course on "de meetkunde van het aantal" [geometry of the number], the numerative geometry of Schubert, which he admired very much. But the foundations of this geometry were bad. So, for example, the principle of the conservation of number states that the number of solutions of a geometric problem does not change when the associated parameters change. This was his principal thesis. But let us suppose that one passes from the general case to a special case, so that the parameters also change. It can happen that there are several solutions for the general case but one solution only in the special case. But in the special case, the solutions must be counted with their multiplicity. For example, two conics always have four points of intersection: where they are tangent such points of contact count as a double point, and this is what was lacking in Schubert. He gave no definition of multiplicity, no way to find it nor how to calculate it. Also the Italian geometers obtained remarkable results in algebraic geometry, neglecting, however, the foundations. Therefore, I began to consider the foundations. I discussed all of this in my Ph.D. thesis.[1] Since I finished my studies in a very short time, I

[1] *Already in 1900, Hilbert, in his 15th problem, had asked for a rigorous demonstration of the Schubert calculus. But one had to wait until 1912, for the work of F. Severi, and 1930, when van der Waerden proved this by using topological methods.*

asked my father whether he would allow me yet another semester at Göttingen, whether he could pay for it, and he said yes.

Dold: In what year did this occur?

van der Waerden: Well, I stayed at HBS until 1919, for the duration of the World War. Then I went to Göttingen in 1923, and at Göttingen I proved the principle of the conservation of number: I gave a definition of the concept of multiplicity and a method to calculate it. I wrote in the introduction: "The branch of algebraic geometry which came to be called 'numerative geometry' rested until today on a not very secure foundation. Schubert's principle of the conservation of number, on which a great part of this geometry is based, is neither rigorous in the formulation of Schubert, nor in subsequent definitions, where they are either defective or insufficient." Then I gave a precise basis for numerative geometry. I wanted to make it my thesis, but it was too long. Besides, there was a rule that a thesis could be written only in one of two languages, Dutch or Latin. Thus I could not present it in German. So I published my foundations of numerative geometry in several articles in *Math. Annalen*, and I presented as my thesis a statement of these themes without proofs. This solution was accepted, and my thesis advisor was Hendrik de Vries, who has already been mentioned. The thesis—well, what was the date? In 1926 on the 24th of March, I defended my thesis in the grand hall of the University of Amsterdam.

Dold: Thus you worked on your thesis in Göttingen, and immediately afterwards you had to do military service. Were you able to work on your thesis during this time?

van der Waerden: I wrote the thesis during my service as a marine at den Helder. Naturally, I was not free to go to Amsterdam to discuss my thesis, and I did my thesis practically by myself. At Göttingen I had above all made the acquaintance of Emmy Noether. She had completely redone algebra, much more general then any study made until then, and she was in fact my teacher at Göttingen. Thus I proved my theorems with the methods she had developed.

Camilla van der Waerden: You also had a Rockefeller grant to stay in Göttingen.

van der Waerden: Yes, after one semester at Göttingen, Courant started to take notice of me. He procured for me, on the recommendation of Emmy Noether, a Rockefeller grant for one year. With this I studied another semester at Göttingen and one semester at Hamburg with Artin.

Dold: Who was at Göttingen then?

van der Waerden: Naturally there was Hilbert, who was very affable. Often he even invited me to his house, but I cannot say how interesting my research was to him.

Dold: Who else was there?

van der Waerden: Felix Bernstein was also at Göttingen. And then there was as "Privatdozent" Hellmuth Kneser, the second of the three Knesers (son of Adolph Kneser, father of Martin Kneser). Others of my age were, in the first place, Hans Lewy and Kurt Friedrichs, who worked on PDEs; together they had proven the existence and uniqueness of solutions. However, I had the most contact with Hellmuth Kneser, to whom Brouwer had written a letter of introduction for me. Thus from the beginning I was in contact with him, and from him I really learned topology. Kneser and I used to have lunch together; after having eaten he went home, but on occasion we first took a brief walk. We strolled through the woods of Göttingen, and he taught me many things. It always went like this: he made some observations which I did not completely understand, so I then went into the library to find out what he was really saying. The next day I asked him if the interpretation was correct. Thus I learned, for example, topology.

Dold: One often hears about the celebrated reading room of Göttingen.

van der Waerden: Yes, it was splendid; you could take the books from the shelves yourself. This was really not possible anywhere else. At Amsterdam, when you went into the university library, first you had to look in the catalogue, fill out a form, and put it in a box. And then, after half an hour, you obtained the book requested. At Göttingen, instead, where you could get the books from the shelves by yourself, it often happened that right near the book you were looking for there was another interesting one.

Dold: Was the Göttingen atmosphere as free as they say?

van der Waerden: I think so.

Dold: Did you meet your wife at that time, while at Göttingen?

van der Waerden: No, that happened later. I obtained a chair at Groningen.

Camilla van der Waerden: However, you received the offer to Groningen from Göttingen.

van der Waerden: It went like this: In the reading hall of the public library at Amsterdam I had studied a treatise in analytic geometry by Barrau, which contained in Part II many theorems insufficiently proven, even insufficiently formulated. I wrote to the author, to Barrau. I wasn't yet a student of the university; I was still at HBS. Barrau, then a professor at Groningen, said that should he leave, they would have to nominate van der Waerden as his successor. And things happened like that. He went to

Utrecht, and they offered me the chair at Groningen.

Dold: When did you go to Groningen?

Camilla van der Waerden: In 1927 or '28. And then in 1929 we met.

van der Waerden: It was in 1927.

Camilla van der Waerden: At the same time they made you an offer to Rostock.

van der Waerden: Yes.

Dold: How was the situation at Groningen? How many students were there? Did you have interesting colleagues?

van der Waerden: At Groningen there was van der Corput, from whom I learned many things, above all his asymptotic expansions. He wrote a book on asymptotic expansions which I read.

Dold: Did you begin to write your book on algebra while you were at Groningen?

van der Waerden: Yes. Then, in 1929, I took the position of visiting professor at Göttingen, and there I met my wife.

Camilla van der Waerden: When I came to Göttingen, you weren't there, but my brother (Franz Rellich) was there. I came to stay with my brother and worked in a pharmacy. Later, in the summer, you came as a visiting professor, and that's how we met. Then we were married, and everything went well and was beautiful, even very beautiful. We met in July and were married in September. Then we went to Groningen. After a while, Emmy Noether called, I surely remember, and said, "Time to end the honeymoon; back to work again!" Then he put himself back to work and finished the book in one stretch. I surely remember.

Dold: This book on the foundations of algebra (*Moderne Algebra I*, Berlin, 1930) was a great success. Did you have many readers right from the beginning?

van der Waerden: Yes, from the beginning. With my book, the *Algebra*, it went like this: Artin was supposed to write a book and wanted to write it with me. Having finished the first chapter, I showed it to Artin. Then I sent him the second and asked him about the progress of his part of the book. He hadn't yet done anything. Then he gave up the idea of writing the book with me. Nevertheless, the book is based on lectures of Artin and Noether.

Dold: How long did you stay at Groningen?

van der Waerden: At Groningen, two years; then we went to Leipzig.

Camilla van der Waerden: This happened in 1931. In 1933 we probably would not have gone anymore.

Dold: Which mathematicians were then at Leipzig?

van der Waerden: There was Koebe.

Camilla van der Waerden: The mathematicians did not attract you, but the physicists Heisenberg and Hund—not the mathematicians.

van der Waerden: Heisenberg and Hund held a seminar together, and I attended. It was on this occasion that I learned physics. At Amsterdam the physics instruction was not good; there I had followed the lessons of van der Waals, the son of the Nobel laureate Johannes Diderik van der Waals.

Dold: How did these contacts influence your work?

van der Waerden: I wrote a book on group theory and quantum mechanics. There are applications of group theory to quantum mechanics, made at that time by John von Neumann and Wigner. Hermann Weyl had written a book on the subject entitled—I think—*Group Theory and Quantum Mechanics*. However, his book was so difficult that no one understood it. Hermann Weyl wanted to write mathematics for beauty's sake, but I did not find it very beautiful. Thus I wrote a new book on the method of group theory in quantum mechanics. The book was well received by physicists and was rapidly sold out. Later I rewrote it in English; it is still available.

Dold: Did Heisenberg and Hund remain at Leipzig?

van der Waerden: Heisenberg went to Berlin.

Camilla van der Waerden: Much later, in the last year of the war, he went to Berlin to the Kaiser Wilhelm Institute (now the Max-Planck Institute).

Dold: During the war, did things continue normally? Were there students, or were they all drafted?

van der Waerden: Most of the students were drafted, but I had one who later became famous. He was the Chinese Wei-Lang Chow (1911–1995). Together we wrote a paper on the method of representing an algebraic variety by means of parameters. To every algebraic variety is associated a form which I invented. Chow gave the proof. We published a paper together on this.

Dold: Does the famous dissertation of Chow come from this common work?

van der Waerden: Yes. We found the way to represent an algebraic variety by an equation. That is to say, when an r-dimensional variety is intersected by r hyperplanes, we consider the points of intersection. The dimension decreases by one with each hyperplane, and thus the intersection with r hyperplanes is a finite set of points. Each point can be determined by its coordinates. Now if one intersects with $r+1$ hyperplanes, there will be a condition for these $r+1$ hyperplanes to have a point in common with the variety. This brings us to an equation,

whose coefficients are the Chow coordinates. I had the idea, and Chow, as I said, found the proof. Now W-L. Chow is in America and is a famous mathematician.

Dold: Chow is your most celebrated student. But you have had other students who became famous. Wasn't Herbert Seifert your student at Leipzig?

van der Waerden: Yes, Seifert was my assistant at Leipzig. However, he wasn't my student. When I went to Leipzig, he was already a mature mathematician. He wrote a beautiful book on topology. Later at Zürich I had many students who worked on quadratic forms. Their dissertations were published by me, together with one of my works, with the title *Studies on the Theory of Quadratic Forms*, edited by me and Herbert Gross. Other than Gross I can recall Aeberli, Germann, Benz, and Demuth.

Dold: At Leipzig you also knew the philosopher Gadamer?[3]

Camilla van der Waerden: We were very close friends. It was really very nice.

Dold: Was it Gadamer who aroused your interest in Greek mathematics?

van der Waerden: Yes, Gadamer had worked a lot on Plato. I even took his courses.

Dold: When did this happen?

Camilla van der Waerden: At the end of the war. He gave a beautiful course.

Dold: And this increased your interest in Greek mathematics?

Camilla van der Waerden: One can't say for sure. During the war we did not talk about science with them. With Litt and Gadamer, who were both philosophers, we spoke of Nazism and how it would continue. Neither of the two were Nazis. We then did not talk about science, only, in fact, of how it would continue. We were so trapped during the whole time of Nazism. Instead, with Heisenberg and with Hund we talked about science and not about politics. It was a strange thing.

van der Waerden: Gadamer gave a course on Plato's Republic, which I attended. This happened during Nazism. He explained, as Plato shows in the Republic, that a dictator is necessarily antagonistic to a reasonable person and finally that a dictator necessarily destroys himself. At first he ruins his enemies, then his friends, and finally himself. There were certainly also Nazi students in the class, but they did not understand him.

Camilla van der Waerden: They never understood anything.

Dold: This happened during the war. And then you had to leave Leipzig?

van der Waerden: On the 4th of December, 1943, we were bombed out, and my wife and I, with the children, left for Dresden.

Camilla van der Waerden: My brother was in Dresden. However, we remained there only one night.

van der Waerden: The brother was Franz Rellich. During the trip from Leipzig to Dresden we met one of my students. She was on the same train and said, "Come to us at Bischofswerda, where you will be safe." Bischofswerda is a small town in the vicinity of Dresden.

Camilla van der Waerden: There we remained a year, or perhaps a little longer. We returned to Leipzig at the end of 1944. The city was under heavy air attack.

Dold: Were you able to take anything with you?

Camilla van der Waerden: My husband said, "You must take nothing." But I secretly put in the knapsack some silver for each one of us—we were five—a knife, fork, and spoon. Later this proved to be so useful.

Dold: Then came the fall of the Third Reich.

Camilla van der Waerden: We survived in the country in Austria. In 1945 we could no longer take the incessant bombardments. So we went to my mother, who lived in the country at Tauplitz, near Graz.

Dold: Were you able to dedicate yourself to mathematics there?

van der Waerden: No, for a certain time, I did nothing.

Camilla van der Waerden: There we discovered how difficult it is to procure food. From there we went to Holland.

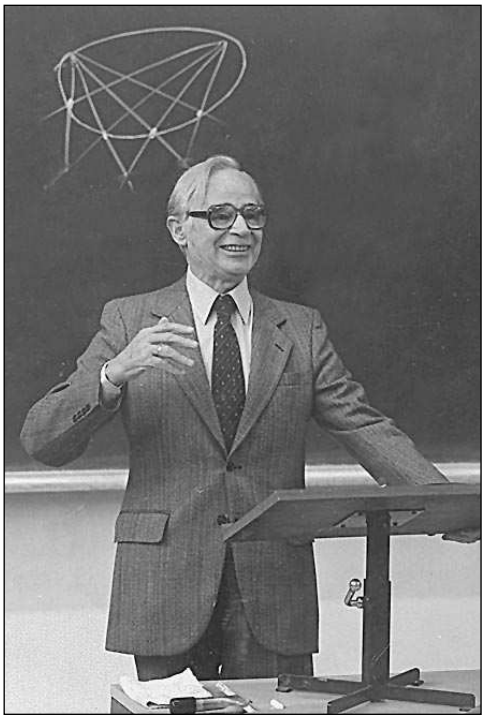
Dold: When did you return to Holland?

van der Waerden: In July 1945. At Tauplitz we were "displaced persons". The Americans were there, and they took us away in buses.

Camilla van der Waerden: The Americans said, "Now, everyone returns to their country of origin." Thus we Dutch should return to Holland. Johannes Heesters, from whom my husband sought advice, remained in Austria; he did not return to Holland.

Dold: Did you have a job in Holland?

[3] *Recently Gadamer recalled, in a letter to Yvonne Dold, the following episode: "The time at Leipzig, those awful years, created above all precious links of friendship. I had the joy of stimulating van der Waerden's interest in the birth of science. Since I was an old friend of Franz Rellich, our interactions were wonderful from the beginning. When the war began, I had the opportunity to perform a little act of heroism. When van der Waerden was arrested for being a Dutchman, an expedient came to my mind. Once I had helped the wife of the then chief of police on her philosophical travails and thus I also had the opportunity to make the acquaintance of her husband. I wrote to him, and van der Waerden was released, and the chief of police thanked me, for, after a few days, the liberation of all the Dutch citizens was ordered."*



van der Waerden, Zürich 1973.

Camilla van der Waerden: It is impossible to describe the situation in which we found ourselves at that time. No one can imagine this.

van der Waerden: I had an offer from Utrecht. During the war they had written asking if I wished to come to Utrecht. I answered, "Not now, but after the war I shall come." If I had gone to Holland during Nazism, I would have received the title from the Nazi minister of public instruction. And I did not want this to happen. Then we arrived indeed in buses. In the meantime my parents had died, and we went to live in the house which my father had constructed at Laren.

Camilla van der Waerden: We arrived without money, without anything, and found no work, not in instruction nor anywhere else.

van der Waerden: Then there was this offer from Utrecht, where my good friend Freudenthal was. The papers went to the minister, but the queen refused to sign them, because during all the Nazi time I had been in Germany.

Camilla van der Waerden: One can really understand it. Afterwards I understood it all.

Dold: Thus you were without a position. You had a house, but nothing else. How did you get along?

Camilla van der Waerden: One day he came home and said, "We still have enough to live for one more month, and then we shall have nothing left."

van der Waerden: Finally, one day Freudenthal called me and wanted me to come to Amsterdam to talk. I went to Amsterdam, and Freudenthal told me that he was able to find a position for me at Shell. "Would you accept it?" Yes, of course; I accepted it most willingly.

Camilla van der Waerden: So we were saved. I have always said that they can take everything away from us but our intellect. And so it was.

Dold: What did you do at Shell?

van der Waerden: At Shell I solved some problems which the engineers found too difficult. It was entertaining. They had quite different problems: for example, what is the best circuit for regulation devices? Problems of optimization, in a word. At Shell there was another mathematician with whom I worked on questions of optimization, and together we found beautiful solutions.

Camilla van der Waerden: It was a good time for us, something quite different for a while.

Dold: How long did you remain at Shell? What happened afterwards?

van der Waerden: In 1947 I spent a year at Baltimore. They wanted me to stay, but I refused and preferred Amsterdam. Amsterdam is a city university, and there the queen was unable to interfere. It was van der Corput who intervened and had them make me an offer to Amsterdam.

Dold: Nevertheless, you did not remain at Amsterdam very long.

Camilla van der Waerden: That gave a lot of trouble there. They had made such efforts for him. He left because he got an offer from Zürich.

van der Waerden: We were two years at Amsterdam.

Camilla van der Waerden: And in 1951 we came to Zürich.

Dold: Did you spend the rest of your life here at Zürich?

Camilla van der Waerden: Two years later he had an offer from München; in 1953 we could have gone. But we did not accept it, because of our children, who had become uneasy with all the changes.

Dold: Who were your colleagues at Zürich at that time?

Camilla van der Waerden: Finsler and Nevanlinna.

van der Waerden: Yes, Finsler and Nevanlinna. We were just three professors then; today there are seven chairs in mathematics. The special thing about Zürich is that there is also ETH. Heinz Hopf was here and Beno Eckmann. Together with Eckmann I published the "yellow series", the series started by Courant. These are books with yellow covers; my algebra was published there. Eckmann and I edited the series for quite a while, until I left it completely to him.

Dold: Did you have good rapports with the colleagues at ETH?

Camilla van der Waerden: Very good, excellent. There was a seminar which he always attended. My husband made no distinction between ETH and the university. Sometimes he said to students, "It is better to take these classes at ETH, where they are at the highest level."

Dold: When did you get interested in the history of mathematics?

van der Waerden: When I was a student, when Hendrik de Vries gave a course on the history of mathematics. After that I read Euclid and some of Archimedes. Thus, my interest began very early. At Göttingen—the first time I was

there—I attended the lectures of Neugebauer, who gave a course on Greek mathematics.

Dold: Neugebauer worked mainly on the Babylonians. Did he also give seminars on Greek mathematics?

van der Waerden: He lectured also on Greek mathematics. At that time, at Göttingen, Neugebauer worked above all on Egyptian mathematics and gave classes on it. His thesis was precisely on Egyptian mathematics. This was very stimulating. Later I visited him once at Copenhagen, and then he spoke to me of Babylonian astronomy. This was most interesting to me.

Dold: When did you begin your work on the history of mathematics? Your book *Science Awakening* appeared, it seems to me, at the beginning of the 50s. Did you write the book while in Holland?

van der Waerden: Yes. Here in the introduction (of the German translation) is written "Several well-disposed reviewers of my book, *Ontwakende Wetenschap*, first published in Dutch in 1950, recommended that the book be translated into German." Helga Habicht-van der Waerden, my oldest daughter, has now made a faithful and readable translation of it (*Erwachende Wissenschaft*, Basel/Stuttgart, 1956). The second, enlarged edition appeared in 1966.

Dold: What were the reactions to the book? To *Erwachende Wissenschaft*?

van der Waerden: Oh, it was widely read. It has sold well and is often cited. It has been translated into many languages: Japanese, English, and Russian.

Dold: Was this your first publication on the history of mathematics?

van der Waerden: I think so.

Camilla van der Waerden: Yes, it was the first.

van der Waerden: From then on I remained interested in the history of mathematics, also in the history of astronomy, which more recently has interested me even more.

Dold: Have you also been interested in the history of quantum mechanics?

van der Waerden: No, not in the history of quantum mechanics. My *Sources of Quantum Mechanics* is a source book.

Dold: When you came to Zürich in the 50s, did you give a course on the history of mathematics?

van der Waerden: No, I think not; I gave courses in mathematics, but I also worked on the history of astronomy and mathematics.

Dold: If I am not mistaken, you were also engaged in Indian mathematics.

van der Waerden: Indian mathematics, no—Indian astronomy. I worked on Indian astronomy, on Aryabhata.

Dold: What mathematics did you work on since you came to Zürich?

van der Waerden: Let's see. An important paper of mine appeared in the *Math. Zeitschrift*. And in *Math. Annalen* there appeared a series of papers with the title, "On Algebraic Geometry" (ZAG): I, II, ..., XX.

Camilla van der Waerden: These papers on algebraic geometry date from before the 50s, not from when we were at Zürich. There you did no more, no?

van der Waerden: This is not true. The last paper, ZAG XX, is rather recent, from 1971.

Dold: So, you worked in the theory of groups, in algebra, and, together with Heisenberg and Hund in mechanics, in number theory, which one can consider part of algebra, and in the history of mathematics. These are quite different areas. Which of these fields gave you the most pleasure?

van der Waerden: Actually, algebraic geometry.

Camilla van der Waerden: But now, as far as I know, it is the history of mathematics.

van der Waerden: Yes, and the history of astronomy.

Camilla van der Waerden: This pleased him the most, to tell the truth, for many years.

Dold: Has your wife always been interested in the history of mathematics? This is really easier to understand than mathematics.

Camilla van der Waerden: I have always preferred that he were more involved in mathematics. He didn't do it. I have always said he spends too much time on history and truly too little on mathematics.

Dold: Were your children interested in mathematics? Your daughter Helga translated the book (*Science Awakening*) into German, so she had some interest. And the other two?

van der Waerden: Absolutely no. None of the three had any interest in mathematics. Perhaps the youngest of my grandchildren has some, but it is still too early to tell; he is only ten years old.

Dold: Under your direction the institute at Zürich grew. You succeeded in obtaining more positions. When you arrived, there were only three chairs. How many were there in 1973, at the time of your retirement?

van der Waerden: Not more, I think. But yes, Gross came to the university before my retirement. He was temporarily at ETH.

Dold: When you went into retirement, the secretary of education (of the Canton Zürich) Künzi created for you, on the occasion of your seventieth birthday, an Institute for the History of Mathematics, with a library.

Receiving the honorary doctor degree at Leipzig, June 12, 1985. At right, Professor Rathmann, president of the University (with kind permission of the University Archives Leipzig).

van der Waerden: Yes, however, a part of the library was my personal library, which I donated to the Institute.

Dold: You continued to work in this institute for many years.

van der Waerden: Yes, Neuenschwander wrote his thesis with me.

Camilla van der Waerden: First he wrote his thesis with you, and then the Institute was founded. But your successor didn't want to know anything about the Institute, nor any of the others.

van der Waerden: The Institute was abolished by my successor.

Dold: In Switzerland interest in the history of mathematics is very rare. Do you have an explanation for this? It really is a rich nation, which could afford something.

van der Waerden: Yes.

Camilla van der Waerden: The only one now interested is Costantinescu, who works at ETH and always tries to organize something, at least a course given by a "Privatdozent". He notices again and again that the students are much interested. Whenever he takes an initiative, there is always a lot of attention. But also he cannot prevail.

Dold: Perhaps the right people are not here.

Camilla van der Waerden: This is certainly a reason. What people want is a historian of mathematics who is also a mathematician. This is a handicap for many. In this sense my husband did not have any difficulty.

Dold: After the Institute was abolished, did you continue to do research here at home? I know that you worked on the history of ancient mathematics and have also written a book on the history of algebra, dealing, above all, with the history of modern algebra (*A History of Algebra*, Berlin/Heidelberg, 1985), of which you were a part.

van der Waerden: Yes. My latest paper is about the history of astronomy. I wrote the first part with Burckhardt, "The Astronomical System of the Persian Tables I", in 1968. The second part appeared much later, in 1987.

Dold: Was Burckhardt already in Zürich when you arrived?

van der Waerden: I became acquainted with him much earlier, in the days of Göttingen. This is our only joint paper.

Camilla van der Waerden: Burckhardt was of great help to my husband when we came here, without knowing the Swiss situation. If he had not been here! He helped and advised my husband in everything. In 1951 the situation in Switzerland was quite different.

Dold: Are you continuing your work on astronomical systems?

van der Waerden: No, this subject is now over. Since then I have published no more. But the subject still interests me.

Dold: Did you have friendly relations with other historians of mathematics? With Freudenthal, for example?

van der Waerden: Yes, Freudenthal was Brouwer's assistant before becoming professor.

Camilla van der Waerden: He became professor when we were still in Holland. Was Freudenthal younger or older than you?

van der Waerden: He was much younger.

Camilla van der Waerden: He died quite a while ago; he was much younger. He survived the war in Holland, even though he was Jewish.

Dold: What were your relations with the German historians of mathematics?

Camilla van der Waerden: I should mention another, Weidner, who was at Graz. Each year in the summer we visited my mother, and each time my husband spent some time with Weidner. It was most pleasant to be with him. And other historians? I can't remember whether or not there was somebody at Leipzig. Was there anyone at Leipzig who was interested in the history of mathematics?

van der Waerden: No.

Camilla van der Waerden: He was always a great solitary figure.

Dold: It is marvelous all that you have told me. Thank you so much!