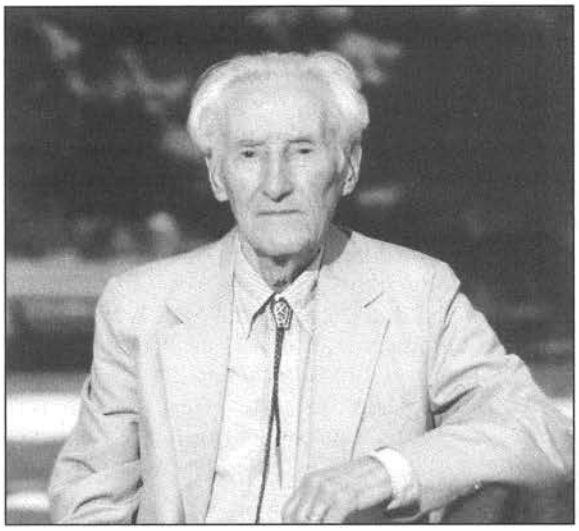
Interview with Arnold Ross

The following article is based on interviews with Arnold Ross conducted in February 2001 by Allyn Jackson. The assistance of Daniel Shapiro and David Pollack, the Ohio State University, and of Madeleine Ross is gratefully acknowledged.



Arnold Ross, summer 1996.

Arnold Ross has been a major figure in American mathematics for the past several decades. He is best known for his program for mathematically talented high school students, which since its founding in 1957 has had various official names but is referred to, universally and fondly, as the Ross Program. Through this program Ross's love of mathematical exploration and his uncompromising standards have touched the lives of over 2,000 youngsters.

From his years as a student at the University of Chicago in the 1920s and 1930s, through his positions as chair of the mathematics departments of Notre Dame University and of the Ohio State University, Ross came into contact with some of the leading mathematicians of the twentieth century. While he has always taken an active interest in research, especially in number theory, his true calling is education. He seemed always to be one step ahead, organizing a program to improve teachers' mathematical knowledge before Sputnik woke the nation up to the inadequacy of mathematics and science instruction, and launching a program for inner-city minority students before the term "underrepresented groups" became a buzzword. In all his endeavors his aim is to kindle a passion for intellectual challenges.

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Photographs for this article are courtesy of the Ohio State University.

Early Years in Odessa

Arnold Ephraim Ross was born Arnold Ephraim Chaimovich on August 24, 1906, in Chicago, an only child of Jewish emigrants from the Ukraine. In 1909 his father was not working, and his mother, a physical therapist, was the sole supporter of the family. She and Arnold then left the United States, bound for Odessa, where her extended family could provide help and security. The outbreak of the First World War in 1914 and the Russian Revolution in 1917 caused famine and economic deprivation. But young Arnold's education was not neglected.

Notices: *From the beginning you had a strong love of learning. Where did that come from?*

Ross: My mother. She knew that we were surrounded by proud people who wanted to talk Yiddish. But she wouldn't have it. She made me feel from the time I was small that the duty of everybody is to first master the language of the country they live in. The result was that I spoke very good Russian. The theater was very good in Odessa and also very much respected and liked by the intelligentsia. I loved the theater, I loved the language. I always had a deep feeling for the mystery of language as a tool for communication.

My mother's attitude toward study and learning was not rigid, but I was encouraged to read. We had very little money, and there were no public libraries, so she subscribed to a private library. We could not really afford it, but we had it. So I did an awful lot of reading. Among the things I absorbed was respect for people of learning and a love of exploration—first geographical exploration and then explorations of all kinds.

Ross 45th Reunion Conference

On July 27–29, 2001, a reunion conference celebrating the 45th year of the Ross Program will be held at the Ohio State University. The conference will be a time for friends of Arnold Ross and alumni of his program to gather in Columbus to renew contact and to celebrate the ongoing mission of the Ross Program.

In August 2000, at age 93, Ross suffered a stroke that left him unable to continue teaching in the program. But his mind and speech are unimpaired, and he plans to attend the reunion conference.

The conference will feature scientific lectures on a variety of topics. Many of the program alumni went into fields other than mathematics, so the talks will be accessible to nonspecialists, and some will be geared to current participants in the Ross Program. Capping the conference will be a banquet sponsored by the Clay Mathematics Institute, which has worked in partnership with the Ross Program for the past two years.

Information about the Ross Reunion Conference is available on the Web site `http://www.math.ohio-state.edu/ross/rossconf2001.html`. The Ross Program is also working to update its database of e-mail addresses of program alumni and friends. A recent version of that list is posted on the Web at `http://www.math.ohio-state.edu/ross/alumni/`. The program organizers would appreciate additions or updates to this information.

—*A.J.*

My uncles were all medical people, and one of them, whom I especially loved and admired, was an X-ray diagnostician. This uncle was responsible for my opportunity to start studying mathematics. His own boy was very talented, so he hired the mathematician S. O. Shatunovsky as a tutor. There were lots of anecdotes about Shatunovsky. He was Jewish and had trouble getting a university position. Finally his colleagues got him a special permit to do so, and he had to pass an examination. When Shatunovsky came to be examined, it was not a friendly audience. One of the examiners asked about something he himself had discovered just that morning. Shatunovsky thought for a couple of minutes and came up with an answer. Whereupon the examiner said, "Where did you learn that? I thought I discovered it this morning!" So you see what I would take pride in from the time I was very young.

I loved mathematics, so when my uncle had Shatunovsky tutor his boy, I wanted to be a part of it. And of course my uncle said yes. What was Shatunovsky paid? Well, inflation was so pronounced that money didn't mean very much. His fee was a pound of French hard candy. So when Shatunovsky was employed by my uncle to tutor his boy, I was included in that pound of candy.

Notices: *Did Shatunovsky teach his lessons in Russian?*

Ross: Oh, yes. His Russian was perfect. He was also a charismatic lecturer.

This was the time of the famine, so many universities were closed. A group of university professors put together a *Gymnasium* [academic school]. They were all very able people mathematically. They did not teach us according to the prescription of a textbook. Our geometry teacher never lectured on proofs in geometry. What he did was say, "Now, let's take a look at this. What do you think is true?" We made guesses, some wrong, and we had to justify them. I loved to go to the blackboard in these sessions. That was really the beginning of my being cut off from the kind of strict education where you study to pass exams.

Later, when the University of Odessa reopened, Ross was among a small group of youngsters given special permission to attend courses there. Shatunovsky was one of the professors.

Ross: The students of course were crazy about Shatunovsky. Once we were on the veranda of the university, extolling Shatunovsky's remarkable personality and teaching. A biologist overheard us and said, "I don't know any mathematics, but nobody could be this good." So we said, "All right, come and listen to his lecture." "But I don't know any mathematics, and really I don't want to," he said. But we made him come and hide in the back of the room. When the lecture was over, we were all moving to the door; and there he was, his eyes shining, and he said, "I didn't understand a thing, but it was so wonderful!"

Notices: *You left Odessa in 1922, when you were about 16 years old. How did you get out of Odessa?*

Ross: I was born in Chicago, so I was an American citizen, according to the laws of that period, and because of that I was given my passport into the United States without any difficulty. But to get out of Russia, you had to have the permission of the secret police. So I went to the chief of the secret police to get permission. He questioned my being an American citizen. He said, "According to the laws of the Soviet Union, you are not an American." I said, "But I am an American!" It went on like that, back and forth. He had a gold pince-nez, which showed he had a sense of culture. He was getting a little angry; then all of a sudden he stopped, looked at me carefully, and realized that he was fighting a child. He signed my papers and said, "Get out of here before I change my mind!" I knew well enough to get out!

Then I had to take a ship to Constantinople [now Istanbul]. I'm here today because the police were not honest and my mother did not know how to discreetly bribe them. Fortunately, one of our relatives knew very well how to do it. By the time this relative left the money properly and I got permission to go, I had missed the ship. That ship was mined and also perhaps overloaded. Half a

dozen people were saved out of a couple hundred. So you see, that is fate.

Student Days in Chicago

Determined to get on the next ship, Ross went to see the ship's captain. Although Ross had the necessary documents, the captain was wary of taking such a young passenger traveling alone. Ross sat on the captain's doorstep every morning for two weeks until the captain relented. After arriving in the United States, Ross returned to Chicago, with the intention of studying at the University of Chicago with E. H. Moore, a pioneer in modern topology. Moore led the mathematics department at Chicago from 1892 until 1927, when Gilbert Ames Bliss was made chair. Moore built the department into an important center for research.

Notices: *Did you know about E. H. Moore when you were in Odessa?*

Ross: Yes. My *Gymnasium* teachers told me, "If you can go to the University of Chicago, study with E. H. Moore." I had that in my mind. When I got to Chicago I got a job in a bookbinding shop. The owner was a friend of the family. He thought I should not try to get into the university. He wanted me to learn linotyping. He said, "That's the place where there's money." He was very opinionated, but I didn't think he was learned enough to really understand.

Notices: *Did you speak English then?*

Ross: I would not say I could speak English, but I could understand some, because I had studied English during the year before I left for America. I also studied English when I got to Chicago, at the Lewis Institute [now the Illinois Institute of Technology].

Notices: *Did you live with your father in Chicago?*

Ross: Only for about a week or so, until I got my first job. We never got along. I got a room in a house owned by friends of the family. But the environment was very unintellectual.

Notices: *What did your father do?*

Ross: He was a mechanical engineer. He had gotten his degree in Germany. But he was not very ambitious and was never successful as an engineer. By that time it was obvious I wanted to be a mathematician. My father said, "If you study engineering, I'll help you. If you want to be a mathematician, you can starve on your own!" Interesting, isn't it?

There were times when I would work twelve hours straight in the bookbinding shop. One time I worked till early morning, almost around the clock. I left the shop and got on a streetcar. The night shift laborers were just getting out. I was hanging on the outside of the streetcar because it was full. All of a sudden I blacked out. The next thing I knew, a huge—to me!—individual pulled me back into the streetcar. I had almost fallen off. Another laborer said something that I didn't quite understand. And the first one shook his head and said, "No alcohol." So the other laborer asked me, "What happened to you? Are you ill?" "Oh, no," I said, "I am not ill. But I am very, very tired. I just got off my shift." I was only 17 years old. The two of them babied me until I got off. You see, mathematics was not formally imbedded in me, but there were many positive influences in my life that were indestructible. That's what I have been trying to give to others.

After working a year at the bookbinding shop, Ross had saved enough for tuition for one term at the University of Chicago. He then enrolled in a course taught by E. H. Moore.

Ross: E. H. Moore was head of the department at the University of Chicago. When he was made head, he was young and untried. But he had worked in Germany and had a very good mathematical background, and he was also very talented. He hired two distinguished German mathematicians [Oskar Bolza and Heinrich Maschke]. Moore held his own, and they respected him even though they considered him an upstart.

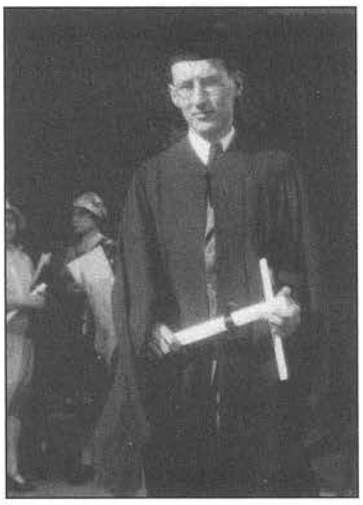
Moore knew that I did not have traditional schooling, so he gave me special attention and encouraged me. He knew how young I was. The university made a special concession for the fact that I had no diploma of any kind and let me take Moore's course in topology. I was the only undergraduate in that course.

Moore's teaching was even stronger than that of our teachers in the *Gymnasium*. He taught us the beginnings of topology. He never lectured. He would tell us what he conjectured, and we were to prove it. If we had suggestions as to what may be true, we would give them; then we would defend them. It was incredibly exciting. He never paid much attention to the school bell. His lessons might last half an hour or one hour or two hours. So it was best for us not to plan our lunches.

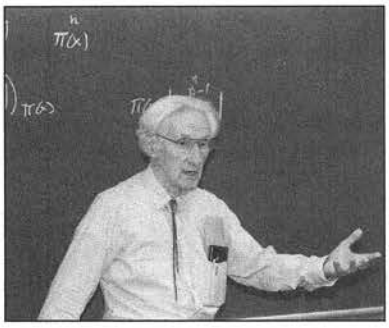
Calculus was taught in a traditional way. But E. H. Moore taught

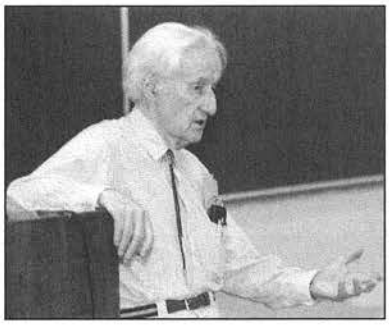
Ross as a boy in Odessa...

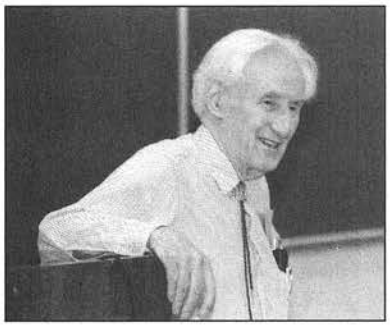
... as a young man in Chicago in the late 1920s...



... as a new Ph.D. at the University of Chicago, 1931.







Arnold Ross, summer 1996, Ohio State.

it using Moore-Smith convergence, studying not ordered but directed sets. This is something that Shatunovsky had discovered independently in Russia, so I was familiar with it. I couldn't understand why the other students had trouble with Moore-Smith convergence. I felt that calculus could not be done any other way! I was too young to know that it wasn't so.

For my Ph.D. I worked with L. E. Dickson, who was known for his work in number theory. He was a very kind man, very hard-working, and he had strong opinions. This was the period after World War I, and there was a lot of German-hating. The German colleagues were sometimes not treated as well as they should have been. When the German Mathematical Society invited Dickson to lecture on algebras and their arithmetic, which was pioneering work, he brushed up on his German so that he could speak in German. He was very prominent and very American, so he could not have been accused of anything. Dickson was awfully good to me, and I respected him very much. After I paid for my first quarter's tuition at the university, I wasn't asked to pay more. Dickson was responsible for most of that.

Gilbert Bliss was also at Chicago then. He worked in the calculus of variations. He certainly was not a trivial mathematician, but he had strange prejudices in education, and he was very narrow-minded in many ways. Individuals sometimes become instruments in slowing down progress. Bliss was one of those people. When I got my Ph.D. with Dickson, Bliss gave me a lecture on discretion. What did that lecture consist of? He said: "Now remember, you learned many things from Dickson, and in a sense you have to always credit him with that and never forget it. Some of my pupils sometimes use my ideas to advance themselves without giving me proper credit." Dickson would never have said anything like that, because he was a most generous man and to him progress was important, not credit-giving. But Bliss was very different.

As one of Dickson's 64 doctoral students, Ross finished his degree in 1931, with a dissertation entitled "On representation of integers by indefinite ternary quadratic forms". That same year he married Bertha (Bee) Halley Horecker, a talented singer and musician who was the daughter of some neighbors of Ross in Chicago. After a two-year fellowship at Caltech, Ross and his wife returned to Chicago.

Notices: *You went back to Chicago around 1933, during the Depression, and you taught at the People's Junior College. What was the People's Junior College?*

Ross: That was a fantastic thing. During the Depression many community colleges closed. A group of very talented, socially minded people decided that all those youngsters who were out of school because there was no place for them to go should have a place. So we started the People's Junior College in a Jewish community center. I was teaching mathematics and physics. We had on the faculty a young economist from the University of Chicago. Chicago was very strong in economics and has always been. He was so accomplished that even as he was teaching in the People's Junior College, he was employed as an advisor by many governments.

The People's Junior College had to be approved by a state education board. Everybody told us, "That board is very strict and doesn't encourage new enterprises. Don't hope to get approval within a reasonable time." A member of the board visited the college, and he came to my classroom. I was very unorthodox, and I made my students participate in discussion in the classroom and do a little exploration. The board member was at first very stiff, but as he participated in what the class was doing, he visibly warmed up. The result was that we were approved right away. In retrospect, everybody was surprised.

Notices: *How long did you teach there?*

Ross: I think almost a year.

Notices: *And then what happened to the college?*

Ross: We tried to keep it alive, but it didn't quite work, because there were very few people who were prepared to give it so much of themselves.

In 1935 Ross joined the faculty of St. Louis University, which is a Jesuit institution. Heightened awareness of racial inequality led the university to start admitting black students in 1944, a bold and progressive move at the time. Another decade had to pass before the landmark court decision Brown v. the Board of Education of Topeka mandated desegregation of the nation's public schools.

Ross: One of my students at St. Louis University was the first black woman to receive an M.S. in mathematics in the South. She was handicapped because she had had polio when she was young, and she was paralyzed in the left leg. The students and the young priests were with me in saying she should be accepted to the university, and that's actually what made it possible for the university to make an exception and to start

accepting black students when it was a very unpopular thing to do.

Usually upon graduation the students would form a marching arrangement and would walk around the block downtown, not far from the building in which the university was holding classes. It was obvious that the marching tempo of healthy students was a little too fast for this student of mine. So I asked one of the youngsters who was directing things if he had noticed she could not keep up. He said, "I didn't. We'll take care of it." They did. The tempo of the whole procession came down to the tempo that could be maintained by my student. Well, it makes you feel good about your young people. I so wanted her to get a higher degree. She was capable, but money was the constraining feature. She was the sole supporter of her aging mother.

Arnold Ross with wife Bee in the 1970s.

Notre Dame Years

Many distinguished mathematicians fled Europe during World War II and came to the United States. One of these was the Hungarian mathematician Gabor Szegő, who spent a few years at Washington University in St. Louis before taking a position at Stanford University. In St. Louis the Szegő and Ross families became good friends. On Szegő's recommendation Ross was accepted to a summer school at Brown University designed to sharpen the skills of young scientists and mathematicians so that they could help with the war effort. Ross went to Brown in the summer of 1941 and came into contact with two more refugee mathematicians, Jacob Tamarkin and Antoni Zygmund. Between 1941 and 1945 Ross periodically spent time doing war-related research in the laboratory of Stromberg-Carlson, an electronics and communications firm in Rochester, New York. He worked on proximity fuses, which are bomb fuses that cause detonation when the bomb comes within a certain proximity of its target. In 1946 Ross accepted an offer to succeed Karl Menger as chair of the mathematics department at the University of Notre Dame. Ross worked hard to improve the research climate there, inviting such visitors as A. Adrian Albert, Max Dehn, Kazimierz Kuratowski, Louis J. Mordell, Marston Morse, Wacław Sierpiński, Thoralf Skolem—and the inimitable Paul Erdős.

Notices: *What do you remember about Paul Erdős's visits to Notre Dame?*

Ross: Paul Erdős was a friend. He would come, lecture, and get everybody excited, with lots of discussion.

Notices: *Did he teach at Notre Dame?*

Ross: That's an interesting story. Paul Erdős was never given an academic job, because the administrators in American colleges thought he didn't know how to teach. What a shocking lack of wisdom! Well, that is so common in academic life. When I invited Paul to come to Notre Dame, he accepted right away. At our first meeting in my office, Paul said, "What will be my duties? You know I have not had a background of regular academic positions." I said, "Paul, you are a distinguished mathematician, so you must have a position that matches your distinction. You are going to be a full professor of mathematics, with all the duties and responsibilities thereto appertaining." So you see, we cut across this idea of his inability to teach. Full professor, with everything—the hard work and the pleasure. For his course in set theory I chose among the graduate students those who could appreciate him. And those students had the most exciting time of their lives. It was a remarkable course—difficult, yes, but not unduly difficult, just real mathematics. People thought Paul might be a bad teacher because of his emphasis on research and on asking new questions. Somehow, in the eyes of many near-sighted people, research and teaching are not related. We still have some people like that. If you knew Paul, you would understand that he would be an excellent teacher because his ideas of how to do mathematics were right.

I knew Erdős's mother—a remarkable woman. Everybody used to ask her to help if they wanted to reach Paul. Paul traveled so much that the only way to find out where he was, was to call his mother. Whenever I had to write to Paul about something urgent, I would write to her to find out where he was traveling, and then on the basis of that information I would choose five places and write to each one of them. Paul entered into the spirit of this. He answered every one of my letters.

Notices: *Did he answer them all the same way?*

Ross: No, but usually my letters were about different things. I would not write Paul five letters that were very much alike. As I said, Paul traveled a lot, so very often he would come unannounced, and usually he would be a welcome guest. One time a friend, a mathematician whose name

"Think Deeply of Simple Things"

Each summer fifty or sixty students, ranging in age from 14 to 19, spend eight weeks on the campus of the Ohio State University as participants in the Ross Summer Mathematics Program. With only a modicum of advertising and mostly through word-of-mouth, the program attracts some of the most talented students from all over the country. The aim is not to turn them all into mathematicians, but rather to give them, in the words of Arnold Ross, "a vivid apprenticeship to a life of exploration." Most of the students are profoundly changed by the experience.

Funding has waxed and waned over the years, but the Ross Program has always managed to stay afloat. The most consistent support has come from the Ohio State University. The National Science Foundation has over the years provided varying levels of funding. Recently, substantial support has come through a partnership with the Clay Mathematics Institute. The program has also received grants from the AMS Epsilon Fund (see "AMS Epsilon Fund Makes Awards", *Notices*, May 2001, page 515) and the Oracle Corporate Giving Program.

The Ross Program has inspired the creation of similar programs at other institutions. Those most closely resembling the Ross Program include PROMYS at Boston University, run by Glenn Stevens, and the Honors Math Camp, run by Max Warshauer at Southwest Texas State University. Others whose educational programs were influenced by Ross include Paul Sally of the University of Chicago and Manuel Berriozábal of the University of Texas at San Antonio.

There are several key elements in the success of the Ross Program. One is the focus on number theory, which allows students with relatively little mathematical background to grapple with deep ideas. Another is the daily problem sets, which Ross has honed carefully over the years. These are not the usual school math problems; many of them simply present a statement together with the instruction "Prove or disprove and salvage if possible." Starting with relatively simple questions, the problem sets lead students on explorations of increasing depth as their ability to handle abstraction grows. This notion is captured in the program's motto "Think deeply of simple things".

Another key element is the role of the counselors. Carefully chosen from the ranks of program alumni, the counselors read the solutions to the daily problem sets and provide extensive, individualized feedback. Because they live in the same dorms as the students, the counselors act as the eyes and ears of the program, alerting the directors to potential problems among the students. The counselors also take special advanced mathematics courses during the program. Becoming a counselor is a point of honor for Ross Program participants, and the continual handing down of traditions helps insure the vitality of the program.

And then there is Ross himself. With his trademark string tie, his Old World manners, and a slight Russian lilt in his voice, he seems an unlikely figure to appeal to a bunch of American kids. How does he relate to them? "That's the magic of mathematics," says Ross's longtime Ohio State colleague, Dijen Ray-Chaudhuri, who has taught in the program for years and whose three children are program alumni. Through the abstraction of mathematics Ross bypasses the usual barriers to communication and introduces the students to a world of ideas.

—*A.J.*

escapes me at the moment, did not have room for Erdős because he had other visitors. So they got into the car and went to look for a room. They came to one place advertising a room, and Paul got out and knocked on the door. A woman appeared, and he spoke to her. Then she got hold of an umbrella and went after him!

Notices: *Why did she go after him?*

Ross: Paul had said, "Ma'am, may I sleep with you tonight?" Well, Paul Erdős is unexpected, isn't he?

In 1947 Ross started a program aimed at deepening the mathematical understanding of high school and junior college teachers. In a report about the program Ross spoke of "the act of personal discovery through observation and experimentation" as a vital ingredient in learning and teaching mathematics. The program received a big boost in 1957, when in response to the launching of the Russian Sputnik satellite, the National Science Foundation began putting large amounts of money into programs to retrain teachers. That same year Ross added an additional component to the program so that a small number of high school students could participate. This component gradually grew into what is now officially called the Ross Summer Mathematics Program. It moved with Ross to the Ohio State University in 1963, when he took a position as chair of the mathematics department there. One reason for the program's success is that Ross has always been able to attract high-quality mathematicians to teach; among those who taught consistently in the program during the 1960s and 1970s were Hans Zassenhaus, Kurt Mahler, and Dijen Ray-Chaudhuri.

Notices: *How did you find the right people? How were you able to recognize in certain mathematicians that they would be effective teachers of young people?*

Ross: Quality of intellect: people who respect struggles with ideas and have gone through that themselves and were victors. Also, I looked for people who were not too ready to compromise and who had concern for students. It was never assured that it would be a success; one had to see what was happening to the students. It was a matter of knowing enough people and being lucky in having some people who were not only intellectually strong but personally attractive. And from there it was a matter of work.

At Ohio State, Ross continued to pursue his ideal of sparking intellectual development through deep involvement with mathematics. Among his many activities was a program that ran in the 1960s intended to expose inner-city children, many of them from minority groups, to advanced mathematical concepts.

In the spring of 1970 the Ohio State campus was rocked by student protests against the Vietnam War and for better treatment for black students. On one especially tense day in late April that year, hundreds

of National Guardsmen with bayonets confronted a couple of thousand students demonstrating in front of the university administration building; this occurred just days before the fatal shootings on the Kent State University campus. Ross and other Ohio State faculty, wearing red armbands to signify their neutrality, formed a line between the guardsmen and the students, attempting to calm the situation. H. Marks Richard, a professor of mathematics at Norfolk State University, who was a graduate student at the time, witnessed the scene. As he explains it, "Dr. Ross put his own life on the line to protect the students."

Notices: *In 1970 students were rioting on the campus. What do you remember of that time?*

Ross: I tried to keep things quiet by walking around the campus. I felt that the students were right in everything except rioting. I gave them a great deal of sympathy, because I felt that they should get better treatment but that rioting was not the way. Walking on the campus at that time was not a very safe thing to do, because rioting could break out anywhere. But whenever I would find myself close to the rioting, I saw some black faces right near me, forming a protective cordon, which meant I had been able to make them see how little sympathy I had for the feelings of racial prejudice.

Around that time I had a student, a young lady, who was very ambitious with regard to learning, and I tried to encourage her. Once when we were sitting talking about our studies, she said, "Professor Ross, I want to ask you something. I hope you won't mind and you'll be candid. Doesn't it make any difference to you that I am black?" Of course, I started laughing. I said, "Not a bit. It just doesn't affect me at all." She looked relieved, because she didn't want to hurt my feelings. We continued discussion of our studies, and I didn't come back to the topic. To discuss that sort of thing would be to honor it with our attention.

In 1976, at age 70, Ross took mandatory retirement from Ohio State. Felix Browder, then at the University of Chicago, encouraged Ross to bring his summer program for high school students to Chicago, and it was held there for two years. Another Chicago faculty member, Paul Sally, was inspired by the program.

Notices: *You met Paul Sally when the program moved to Chicago for two years.*

Ross: Yes. At first Paul was not such an enthusiastic supporter of the program, since at that time he was the chair and finances had to be considered. But now he is very supportive. He also started his own program for gifted students, and he spends considerable time with undergraduates at Chicago, which is very good. He also gave his own money for the Arnold Ross Lecture Series. That is something that could do much good, provided that quality is always held uppermost. For a while it looked as if there would be no support for the series, but Paul Sally gave the money. He has been an immense supporter of that sort of thing.

Madeleine and Arnold Ross in 1996 with Ohio State colleague Dijen Ray-Chaudhuri (far right) and his wife, Joya.

In 1983 Ross's wife, Bee, died after a protracted illness. Her death affected Ross deeply. Friends and colleagues say that during this dark period Ross lived only for his summer program. He would come to life as he taught in the program, eventually abandoning the cane he used during the rest of the year. He was rejuvenated when he met Madeleine Green, a widow and a native of France, who as the wife of a diplomat had traveled and lived all over the world. The two married in 1990.

In the summer of 2000, at age 93, Ross taught for the last time in his summer program. Later that year he suffered a stroke, and although his mind is unimpaired, the physical debilitation meant he could no longer teach. The Ross Program will continue under the leadership of Ohio State faculty member Daniel Shapiro.

Inspiring Students to Excel

Those who have seen Arnold Ross at the front of a class speak of his masterly ability to marshal the group's energy and enthusiasm. At the same time, he never loses touch with individual needs and personalities. His aim is to spark in each individual intellectual experiences that enrich and ennoble.

Notices: *In your summer program the students are extremely competitive. How do you handle that?*

Ross: You encourage it. Except that being competitive doesn't mean being mean, and it doesn't mean that you don't help other people who may

The Arnold Ross Lecture Series is a program run by the AMS in which outstanding mathematicians present lectures to groups of high school students. The lectures are presented once a year in different cities in the U.S. For further information, see "Inside the AMS" in this issue of the Notices.

become competitors. We didn't talk much about these things because that doesn't bring good results. We created an atmosphere where not to help somebody who needed help was undesirable.

Notices: *But did the competition get out of hand sometimes?*

Ross: Ah, but we watched carefully. You see, things get out of hand if you keep hands off. Otherwise, how can they get out of hand? So you have to watch very carefully.

Those kids are phenomenal. If anybody tells me that our children don't have the ability, don't have the interest, don't have this or that—all that is very empty. That is believed by people who keep their hands off the very essential parts of education. They talk about education, but many of them have never experienced good education.

Notices: *The Ross Program has always attracted more boys than girls. Do you think it's true that girls have less mathematical ability?*

Ross: I think that some girls have exceptional talents. No, I think that what happens is grotesque. There are teachers who tell students, "You'd better not try because you won't succeed." Some teachers are not prejudiced against women, but if they think a student is not able, they tell the student so. And that of course is very wrong. I know many cases where there was no exceptional talent, but once there was strong desire to excel, there were no mental hazards, other than the original prejudice, that would stand in the person's way. This business of generalizing about ability is an empty enterprise.

A strong desire to achieve something is terribly important. You may be very much interested in your students and guide them well, but if you don't give them an opportunity to suffer a little on their own with some problems, as a rule nothing happens afterwards. But if you get them excited about doing something, they will fight through.