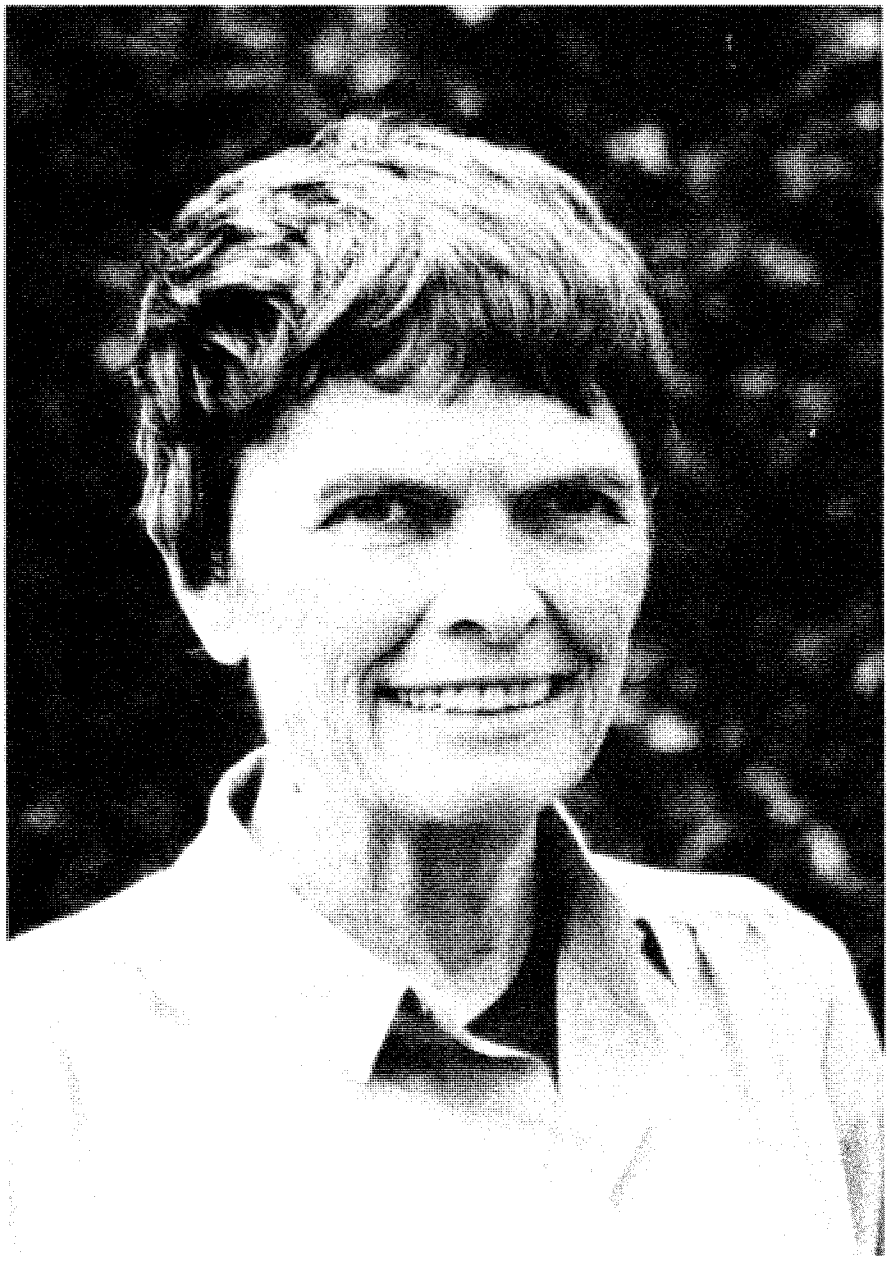

Julia Bowman Robinson

Julia Bowman Robinson
1919–1985

Julia Robinson was a remarkable person. Within hours of her death on July 30, Everett Pitcher called to ask if we could prepare "a personal appreciation" of her to appear in the Notices. This is the result.

Pitcher explained that Robinson was only the third person to die while an active member of the AMS *Council; the death of a retiring president was unprecedented. I undertook to solicit short contributions from various people who knew her well, and to consult with her husband Raphael Robinson and her sister Constance Reid to determine whether these contributions could be effectively combined to convey some personal sense of Julia, leaving an account of her work for a later occasion. Twelve short pieces came in. Reid arranged them in roughly chronological order of content, and made minor editorial suggestions primarily to shorten some and to eliminate repetitions. We hope readers can get some feeling for the human side of the mathematician who served as* AMS *President during 1983 and 1984.*

Leon Henkin
University of California,
Berkeley

D. H. and Emma Lehmer

We knew Julia Robinson first in the early forties when she worked at the Statistical Laboratory in Berkeley during the Second World War. We admired her, not only for her mathematical ability, but also for the steadfast way in which she resisted the efforts of Jerzy Neyman to make a statistician out of her. She was sure that mathematical logic was her field.

Then came the disruptive fifties with the oath controversy, student unrest, the McCarthy era, and school integration. She put her energies into politics, voter registration, and other good causes.

The sixties brought her back where she really belonged, and by the end of the decade she had become famous for her contribution to the solution of Hilbert's tenth problem. We will long remember how excited she was the evening that Julia and Raphael came to our house to put on the board Matijasevich's proof of the missing link to the solution of the problem. A lesser person could have felt regret or even resentment at not having done the work herself, but for her the problem was uppermost. She soft-pedaled her own accomplishments and lavished praise on Matijasevich and others who had contributed to the solution.

The seventies brought recognition, honorary degrees, an invitation to give the colloquium lectures, election to the National Academy; but none of these went to her head. She remained always the same thoughtful, levelheaded, and considerate person who knew what she wanted and usually got her way.

Things were moving fast in the eighties. She became president of the AMS and got a MacArthur prize fellowship. She took both of these honors in her stride. She was looking forward to returning to research as soon as her term as president expired, and it is a great pity that she was not given that chance. It was during the AMS meeting in Eugene, over which she was presiding, that she learned that she had leukemia. She will be long remembered for her devotion to mathematics and for her sterling character as well as for her achievements.

Elizabeth Scott

Julia Robinson and I were graduate students together at Berkeley. During World War II we also did a lot of heavy computing in a large group organized by Jerzy Neyman. After the war we were glad to return to our studies and research, I to astronomy and Julie to mathematics, but there was still overlapping in statistics.

Julie was by then married to Raphael Robinson, who had an appointment in mathematics; a University rule made it quite difficult for the mathematics department to employ both of them. Professor Neyman felt that Julie should be employed and encouraged to do research. He argued that statistics, although technically in mathematics, had a lot of autonomy in budget and appointments, including a "line item" for a research assistant. Although I already held this position, he arranged that I would be moved to another research position to accommodate Julie's appointment. Fine, except that Personnel suddenly interfered, contending that the position, now that it had changed, should be under Personnel—in essence, out of research. Julie was asked to submit a "job description" of what she did each day, so she did: Monday—tried to prove theorem, Tuesday—tried to prove theorem, Wednesday—tried to prove theorem, Thursday—tried to prove theorem, Friday—theorem false. Personnel withdrew. The position remained in the graduate division, and Julie got the appointment.

Throughout her life Julie stood up for offering opportunities to all students. She also encouraged

graduate students and young faculty to have more confidence in their real abilities. She felt that women and minority mathematicians especially needed this support, which she provided with spirit yet in a quiet way. As an example, once at a monthly luncheon of women faculty she gave a wonderful seminar about her own research, but at the same time we could not help but hear of the obstacles that should never have been there. She was not complaining, just stating facts, and pointing out that the situation is improving, even in the sciences, even in mathematics. She encouraged us to work together so that all women who have the ability and the desire to do mathematical research can have the opportunity to do so.

John Kelley

I met Julia not long after I came to Berkeley in 1947. We were a small department then—less than a third of our present size—and we got to know each other rather easily. Julia was in the last year of graduate school, very much a part of the excitement about set theory and the foundations of mathematics that Alfred Tarski had brought to Berkeley. I remember her as a tall slender young woman of gentle demeanor with a nice sense of humor and a gift for lucid mathematical discourse.

The year of Julia's Ph.D. was also the first of the years of ferment marking the arrival of McCarthyism at the University. But the time was also distinguished by a special cameraderie in the mathematics department, a closing of ranks. We levied special assessments upon ourselves to make up a "math fund" which would support any one of us who got into trouble in connection with the infamous loyalty oath. Julia was very much a part of our department's unified opposition to the oath. I remember well seeing her in the Sacramento courtroom at the penultimate legal vindication of those who had been dismissed for refusing to sign the oath.

Julia was offered a professorship at the University of California about a year after she was elected to the National Academy of Sciences. Her gracious acceptance of the University appointment honored the University; her mathematical discoveries honor us all.

Lisl Gaal

Julia and I first met in Professor Tarski's course and seminar in the fall of 1950. I had just returned from a summer in Europe so it was only natural that we should talk of travelling—a subject and an activity of which she never tired.

She always tried to combine her trips to AMS meetings with explorations of the places where they were held. After seeing the movie "Close Encounters of the Third Kind," in which the extra-terrestrials land on the Devil's Tower National Monument, she wanted to go there herself. So last May, as we talked about the August AMS meeting in Laramie, Wyoming, we considered the possibility of a side trip to see the Tower. Unfortunately she did not live to attend that meeting. She would have loved, not only the strangely shaped mountain itself, but also the wildlife around it, especially the enormous prairie-dog colony. She loved animals in the wild—the migrating whales, the sea otters, the Monarch butterflies wintering in Pacific Grove, the birds at Point Reyes. She was interested in everything around her.

She also loved to ride her bicycle and feel the wind against her cheek and in her hair. On my visits to Berkeley, no matter how brief, we always tried to fit in a bicycle ride, sometimes in Tiburon, sometimes on the Sacramento River delta, or—when time was very short—on the Nimitz Trail in Tilden Park.

To me Julia's love of travel and of nature—combined, if at all possible, with bicycling—was as much a part of her as her mathematics.

David Gale

I first heard of Julia Robinson in 1950. A group of us at Princeton had become interested in game theory. Simultaneously there was a flurry of creative activity in the subject at the newly formed Rand Corporation on the west coast. In fact, the main result of my thesis was discovered at the same time by people at Rand. There was, however, one problem which neither group had been able to solve, a conjecture that if two people played a game repeatedly and each kept track of what the opponent was doing and responded optimally, then the pay-off would converge to the value of the game. What we learned in 1950 was that the problem had finally been cracked—by Julia Robinson. Her solution remains to this day among the deeper results of elementary game theory.

Although she was no longer at Rand when I visited as a consultant in the summer of 1955, I recall reading some of her reports: in particular, one in which a certain military type game was solved by making surprising use of Archimedes's discovery that the area of a zone on a sphere depends only on its height.

From the start Julia was associated in my mind with California and the way of life there. When I ended up in Berkeley ten years later and got to know her, I sensed this geographical connection even more strongly. It's a bit ironical. Berkeley in 1965, as we all remember, was the birthplace of the radical student movement which was soon to spread all over the world; but my geographical association verged on—heaven forbid—patriotism, one of the cardinal crimes of the "establishment." Having spent much of my life in a very Europeanized culture on the east coast, I couldn't help feeling that there was something wonderfully American about Julia Robinson. I won't even try to describe what that quality

was. In any case, because of my association with her, I have succumbed periodically to spells of patriotism, by which I mean feelings of pleasure and, okay, pride in belonging to a country which once in a while produces its own special kind of person. Of course, Julia was exceptional in many ways; but one thing that really sets her apart, in my mind—and I hope that historians will take note of this—is that she was so completely "home grown."

Martin Davis

Julia Robinson's writings bear ample testimony to the power and elegance of her work. I would like to tell something of how I personally experienced this power and elegance.

In the summer of 1959, Hilary Putnam and I worked out a flawed proof of an important theorem. The theorem, which was a key lemma in Matijasevich's solution of Hilbert's tenth problem, may be stated as follows:

If S is a computable set of natural numbers (i.e., if there is an algorithm for deciding of a given number whether it belongs to S), then there is an exponential Diophantine equation $E(a, x_1, \cdots, x_n) = 0$ which is solvable in natural numbers for given a if and only if $a \in S$.

Our proof was flawed mainly because it used the unproved (though likely true) assertion that there are arbitrarily long arithmetic progressions consisting of primes. In addition, it used a good deal of messy elementary analysis (including approximations to the logarithmic derivative of the Γ-function). Hilary and I sent our work to Julia at once because she had already worked on this problem and, in fact, we had used some of her methods. Her first move, almost by return mail, was to show how to avoid the messy analysis. A few weeks later she showed how to replace the unproved hypothesis about primes in arithmetic progression by the prime number theorem for arithmetic progressions. At this point we agreed that Hilary and I would withdraw the paper we had submitted for publication and the result would be published under all three of our names (with a footnote indicating the history). Julia then greatly simplified the proof, which had become quite intricate. In the published version, the proof was elementary and elegant.

Saunders Mac Lane

Julia was a valued member of the National Academy of Sciences. Among the members (1442 of them in spring 1985) there are now a number of women, but Julia was at the time of her death still the only woman in the mathematics section of the Academy. In such matters there is inevitably a first; Julia's accomplishments in logic put her in that position. She was elected in 1976. Subsequently she came regularly to the spring meetings of the Academy and took a modest but effective part in the activities of the section of mathematics. Usually she came with one of her sisters, and together they enjoyed the festivities which the Academy puts on for its members and their guests—the reception in a huge tent on the Academy lawn, the evening concert, the formal introduction of new members (when the President of the Academy describes the major accomplishments of each one), the scientific talks, and the final dinner. Later, her election as the first woman President of the American Mathematical Society apparently seemed somewhat more daunting to her, for she promptly came to ask advice of me and other former presidents. When her term began, she took on the responsibilities of the office with a will and her usual quiet competence.

Ivan Niven

Julia Robinson's term of office as the President of the American Mathematical Society coincided with my term of office as President of the Mathematical Association of America. One of her first actions as president was to call me to express her concern over whether our respective organizations were doing all that they could to help mathematically talented young people from minority groups to achieve their potential. She felt certain that there were many young people of promise in these groups who could enjoy successful careers in mathematics if they could be located and encouraged.

Knowing that others with the same idea had worked on this problem, we started by surveying what was being achieved; for example, by getting in touch with knowledgeable leaders like Gloria Gilmer. We concluded that it was best not to dilute these efforts by launching any new program, but rather to strengthen them in every way we could by our support.

No one working with Julia could fail to be impressed by the depth of her compassion, and by the extent of her dedication to the goal of removing barriers that limit the full development of the mathematical talents of young members of minority groups.

Everett Pitcher

I had met Julia Robinson only once prior to her selection by the Nominating Committee of the American Mathematical Society as President Elect. As Secretary of the Society it is frequently my lot to make the initial approach to candidates. Thus I can report that Julia Robinson was astonished to be asked to be President. She studied the matter for several days, and I thought that she might be waivering over accepting. I learned later that one strong consideration in her deliberations was the fact that a woman had never been President and that if she did not accept the position it might be a long time before a woman who was a natural candidate appeared again. To decline would be a disservice to the cause of equality for women, a cause which she strongly supported. Having decided to accept,

she took the duties of the office very seriously. Her approach and action were always carefully considered but forthright, direct, and based on high ethical principle. As a result, the affairs of the Society were effectively managed and the Society well represented during her term of office. I always found it easy and pleasant to work for her.

Lenore Blum

During the early 1970s, when the Association for Women in Mathematics was actively working to change the position of women in mathematics departments across the country, we always felt encouraged by Julia Robinson's support. It was difficult, however, for us to maintain the delicate balance between acknowledging her obvious symbolic importance to us while at the same time respecting her desire to remain out of the limelight.

With her election to the National Academy of Sciences and her acceptance of the presidency of the American Mathematical Society, she herself recognized and accepted the role of public person. Also, on a more personal level, I believe that the public recognition helped her to acknowledge the significance of her own contributions to mathematics.

In this regard, I feel privileged to have witnessed a side of Julia that I think many other mathematicians may never have seen. We had arranged to meet for lunch with Nancy Kreinberg of the Lawrence Hall of Science to discuss ways of encouraging girls and women in mathematics. When I arrived at the Women's Faculty Club, Julia was sitting in one of those high backed Victorian chairs in a bright floral dress, looking quite majestic. As I came up, she broke into one of her broad impish grins: "Guess what? I have just received some great news—I have been awarded a MacArthur Prize Fellowship for my part in solving Hilbert's tenth problem!"

I insisted that we order a bottle of champagne to celebrate. I can't remember now the details of our luncheon, but I do remember clearly the warmth of three women thoroughly enjoying each other's company and sharing excitement, triumph, and plans for the future. There were several rounds of toasts, and by the end of the meal we had very nearly finished off the bottle of champagne.

Later, when I mentioned this lunch to a friend in the Berkeley math department, he protested, "But don't you know? Julia Robinson never drinks!"

I appreciate that Julia included me in her joy. It's a way in which I will always remember her.

Solomon Feferman

Modest and straightforward about her own outstanding contributions to mathematics, Julia Robinson always took a genuine interest in the work of others and helped foster work of the highest quality.

I was hesitant to call her after I learned that she was in the hospital but found that she welcomed my call. We talked of logic and logicians and open problems and things worth reading. She was particularly interested in news of progress on the editorial project of publishing Gödel's works, with which I have been involved in the last few years.

I would like to insert a footnote in this respect. A few years ago when the Gödel project was struggling for funding, Julia made a substantial personal donation that helped get us started, but the condition of her gift was that it be anonymous. We learned of her death just as the first volume of Gödel's Collected Works was going to press and wanted then to publicly acknowledge her generosity. We are grateful to her family for agreeing to let us do so. A statement about her gift will now appear in the volume—a volume which she helped to bring into existence and which she would have liked, very much, to see.

Julia's optimism and courage during the period of her final illness were very impressive to me. But then Julia always impressed me. There are few I know who were so universally liked and admired.

Leon Henkin

From my long acquaintance with Julia Robinson, over more than three decades, I derived many things of great value. Here I want to mention two from the realm of the spirit.

A picture of Julia remains in my mind. She and I and some friends are involved in the 1956 presidential campagin of Adlai Stevenson, and she is wearing a funny hat and carrying a homemade sign aloft on a mop-handle. Her usual speech, dress, and manner were the very opposite of flamboyant; but on a few occasions her strong, continuing concern for improving the conditions of mankind would break through. The style of quiet decorum she generally adopted was in contrast to the flashes of lively spirit that could be discerned in a wide range of bright or strong feelings when she spoke. Especially strong was her stubborn insistence that opportunity ought to be freely accessible to all—whether economic opportunity or opportunity for access to a mathematical career. She also did not hesitate to take a leadership role in a Berkeley protest against Soviet restrictions aimed at Jewish mathematicians.

When her leukemia was diagnosed during the 1984 Summer Mathematics Meeting and she returned to Berkeley for treatment, many of her friends were hesitant about telephoning her. What could they honestly say that would not add their own worries to hers? I was able to reassure them—she would lighten their worries! She faced her illness with a rare combination of determination to understand and conquer it, a realistic appreciation of the odds against her, and an insistence on continuing to maintain all her other interests in life. I gained strength to tackle my own problems each time I talked to her.

Over the years I learned much from Julia about how to strengthen my spirit and clarity its expression. It was one of my great fortunes to have known her.