EVA ZEISEL

THE ELUSIVE DR. SZILARD

ALICE KIMBALL SMITH

He is a bubbling spring of ideas—including a new theory of aging and the first patent on atomic chain reactions. But because he delights in a home-made cloak of mystery, he remains (except among scientists) almost unknown.

AT A party in a university community a few weeks ago the guests amused themselves by drawing up a list of men who have played unique roles in recent history. They finally agreed upon five who had done things which could not have been accomplished, in their times, by anybody else. The first four are familiar to everybody—Lincoln, Gandhi, Hitler, and Churchill. But the fifth might puzzle even many well-informed people. It was Leo Szilard.

If they recognize the name at all, most people probably remember Szilard only as the man who persuaded Albert Einstein to sign a fateful letter to President Roosevelt—the letter which set in motion the building of the atomic bomb. This would please Szilard, who has gone to considerable pains to avoid notoriety; who has, indeed, sometimes seemed to take a sort of impish delight in creating around himself an air of mystery.

Yet among scientists (especially physicists and biologists) a Szilard legend has been flourishing for a long while. It grows out of his fantastic fertility of mind and his uncanny ability to conceive ideas before their time. It pictures him as an intellectual adventurer, likely to embark at any moment on some excursion far beyond the boundaries of science . . . dedicated to saving the world by a mild and legitimate conspiracy . . . unpredictable just because his behavior is so devastatingly rational.

One reason why this legend has not spread far beyond scientific circles is that he is a man of many interests, in an age when fame goes to the specialist. Although he is in no sense a dilettante, routine bores him. He loves to seize a problem in its early, exciting stage, and to work on it furiously until he begins to glimpse the answer. Then he is likely to move on to something else, leaving the tedious labor—and the laurels—to others.

Szilard claims he is lazy, and at first glance you might think there is some truth in this. At sixty-two he is comfortably overweight, and when he is in a mellow mood his round face looks benignly placid. More often, however, he radiates energy—talking with brusque impatience in a clipped speech which hints at his Hungarian origin by intonation rather than by accent. His reactions are always sharp and quick. Though you may not know what Szilard will think tomorrow, there is never any doubt what he thinks today.

He takes his extraordinary intellectual powers for granted. At present he is in a New York hospital for treatment of cancer. Lewis Strauss, the former head of the Atomic Energy Commis-

sion, recently visited him there to present him with the Einstein medal for "outstanding achievement in natural sciences" and for his scholarship "in the broadest areas of human knowledge." Mrs. Szilard reminded her husband of the distinguished list of men who had received the medal previously.

"Yes," he said, "and it is getting better and better all the time."

This is a complex man, whose personality inevitably provokes argument. To some of his associates he has seemed gruff, demanding, even arrogant. It is true that he has no interest in conventional social chit-chat, and no patience with stupidity; but I can testify that he also can be charming and witty. Aggressive as he is in pushing his pet theories and causes, he has never sought the limelight for himself. He may haggle fiercely over details, but he also has a magnificent detachment and an almost saintly freedom from any sense of grievance toward his detractors.

THE BATHTUB AT THE STRAND

SZILARD is one of a brilliant group of Hungarian *émigrés,* which also included John von Neumann, Michael Polanyi, Eugene Wigner, and Edward Teller. He believes this remarkable concentration of scientific talent grew out of a special environment in Budapest at the turn of the century—a society where economic security was taken for granted, a high value was placed on intellectual achievement, and physics was taught so badly that serious students were thrown upon their own resources.

The son of a civil engineer, he first studied electrical engineering in Budapest and—after a year of officer's training in World War I—in Berlin. There he transferred to physics, earning a doctorate in 1922. During the next decade he published papers on thermodynamics and X-rays. His outstanding achievement was a paper which is now regarded as basic to information theory and cybernetics—and therefore, in addition to much else, to the whole industry of electronic computers. He also filed a patent on the idea of the cyclotron (a machine later developed by E. O. Lawrence) and with Albert Einstein—his friend and associate at the University of Berlin—patented a device for pumping liquid metals.

In the early 'thirties Szilard's natural restlessness was intensified by his early recognition that Germany would soon become uncomfortable for men of independent spirit, and dangerous for non-Aryans like himself. He visited the United States, and returned so little reassured by the course of events that from then on he kept two suitcases packed in his room at Harnack Haus, the faculty club of the Kaiser Wilhelm Institutes in Berlin-Dahlem.

After the Reichstag fire in February 1933, he went to Vienna hoping to find posts outside Germany for anti-Nazi intellectuals. An encounter there with Sir William Beveridge, however, led to the less ambitious scheme of the Academic Assistance Council, set up in London in June of that year. With his help it carried out a memorable rescue operation.

Szilard himself went to work in the then-new field of nuclear physics, using a laboratory in St. Bartholomew's Hospital and later the Clarendon Laboratory in Oxford. At about that time Lord Rutherford announced that the idea of liberating large amounts of energy from the atom was sheer moonshine. Most scientists accepted this as gospel, since Rutherford was both a pioneer in exploring the atom and the most prestigious British physicist of the period.

But Szilard is congenitally suspicious of dogmatism—and besides his imagination had been stimulated by H. G. Wells' *The World Set Free,* which predicted the eventual release of atomic energy. So he began to think about the problem.

As he was waiting one day to cross a street in London, the idea came to him of a chain reaction based on some element which would absorb one neutron and emit two. What would be a suitable element? To ponder this question he needed leisure, for he believes that dreaming is impossible when a man is under a compulsion to accomplish something. He took a room at the Strand Palace Hotel in London, and during the early months of 1934 he did his thinking there in the most comfortable spot he could find—the bathtub. (Any scientist would see, he explained later, that a tubful of hot water provided the simplest way to keep warm during a London winter. Moreover, he was free from interrup-

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Alice Kimball Smith had the co-operation of many friends of Leo Szilard in gathering ideas for this portrait. Mrs. Smith spent the war years in Los Alamos, where her husband, Cyril Stanley Smith of the University of Chicago, was in charge of metallurgy at the atomic laboratory, and where she taught in the high school. Herself a Ph.D. in history, she later became assistant editor of the "Bulletin of the Atomic Scientists" and taught at Roosevelt University. She is now working on a history of the postwar atomic scientists' movement.

tions, except for a worried chambermaid who would knock at the door now and then and ask, "Are you all right, sir?")

Considering the elements one by one, he first thought that beryllium might offer the possibility of a chain reaction. Later he vaguely considered thorium and uranium, although it never occurred to him that uranium might prove fissionable.

His hopes for testing his ideas by experiment were, for the moment, frustrated. Most physicists thought his notion of a beryllium chain reaction was fantastic; he had no funds for research; and apparatus built by a friend in America would not work when he set it up in England. Nevertheless he did take out a secret patent—which he assigned to the British Admiralty—in which the general laws governing chain reactions were described for the first time. His ambition then—and in later efforts to get patents on key atomic processes—was not to make a fortune, but to get control of what he even then foresaw as potentially a terrible danger. He hoped to entrust its development to a foundation, directed by enlightened men (not all scientists) who would use the results for the good of mankind.

CORNERING THE ATOM

IN 1938 his chronic wanderlust, plus growing pessimism about the world situation, led him to the United States, in spite of the offer of a coveted lectureship at Oxford. In February 1939 he "materialized"—the phrase often used to describe his unannounced movements—as a guest at the Columbia University physics laboratory. Here Enrico Fermi, who had arrived a month earlier from Italy, was doing fission experiments with a student, Herbert Anderson.

Niels Bohr had just brought news from Europe that German scientists had induced fission in the nucleus of uranium. Szilard knew what this meant: The Germans would now try to build an atomic bomb, and with such a weapon Hitler could conquer the world—unless the Allies could get one first. On March 3, he and Walter Zinn performed an experiment which showed that neutrons are emitted in the process of fission. The same discovery was made at just about the same time by Fermi and Anderson in the basement of the Physics Building at Columbia, and by Joliot and his co-workers in Paris.

"That night," he said later, "I knew that the world was headed for trouble."

How Szilard used that knowledge is (at least to scientists) a familiar story. With the support of Wigner and Teller, he persuaded Einstein to sign a letter to the President explaining how the splitting of uranium atoms might be used to make "extremely powerful bombs of a new type." Although Einstein's famous formula $E = mc^2$ describes the relationship of mass and energy on which the bomb depends, he had no connection with its development. He was the country's most renowned scientist, however, and his letter—delivered to Roosevelt by Alexander Sachs—did move the government to action.

This devious approach illustrates Szilard's love of intrigue and indirection, plus his habit of moving outside established channels to get things done. In this case he was certainly justified. Twice the government had failed to respond to pointed hints about a possible atomic bomb—and Szilard had learned with alarm that Germany had prohibited the export of uranium from Czechoslovakia. The only other source was the Belgian Congo. Einstein was a friend of the Belgian Queen Mother, and through him Szilard hoped to warn the Belgian government against delivering uranium to the Germans from the Belgian Congo.

In the laboratory at Columbia, where he had joined forces with Fermi and Anderson, Szilard was full of ideas for better procedures. Their neutron source, radon/beryllium, was too high in energy; the piece of uranium to be bombarded was too small. A larger piece would produce more neutrons and hence more conclusive results. Beryllium and uranium were expensive and almost unobtainable, but shortly they appeared—the gift, said Szilard, of some friends of science. It later turned out that he had borrowed $2,000 from a friend, and that the "friends of science" were just a dream, expressing his hope that atomic energy might be developed under beneficent rather than military auspices.

Meanwhile, the laborious experiment itself was under way. Uranium had to be carefully packed in cans and round-the-clock readings made. Fermi, who switched easily from pad and pencil to the manipulation of apparatus, insisted that all share the work. Szilard did not take kindly to this proposal. Along with his willingness to take unreasonable trouble for others, his associates have noted a marked aversion to continuing responsibility, mere routine, or doing anything with his hands.

In addition, he felt that the outcome of the fission experiments was so important that he could not trust himself to do a painstaking job. So he hired a young refugee scientist to substitute for him on the night shift, leaving Szilard

free to consider the meaning of the results. The incident produced a certain coolness between Szilard and Fermi, himself no tyro at thinking. Nevertheless, from these Columbia experiments emerged eventually the design for the first self-sustained chain reaction at Chicago's Stagg Field on December 2, 1942.

There was much concurrent thinking at this time in nuclear physics, but Szilard's special contributions included his stubborn exploration of the use of graphite to slow down the neutrons so that they would more readily hit uranium nuclei. And it was Szilard who wangled a government grant of $6,000 to buy graphite for which there were no laboratory funds.

Oddly, but quite characteristically, Szilard then left the experiments in the capable hands of Fermi and Anderson. Szilard had had the fun of sharing in the ideas. Fermi, for all his brilliance as a theorist, liked mucking about with mechanical things; Szilard, for all his inventive skill, did not. The prospect that the man who performed the experiment might be honored as a second Prometheus, if it occurred to Szilard, did not weigh with him in the slightest.

The organization of the Manhattan Project had begun in December 1941. Early in 1942, Szilard, Fermi, and others from Columbia moved to the University of Chicago's Metallurgical Laboratory—so-called to conceal its real purpose, the production of plutonium in a uranium pile.

If the project could have been built on ideas alone, says Eugene Wigner, Szilard alone could have done it. Others point out that without Fermi the pile would not have worked; but that without Szilard, plutonium production would have been delayed six months to a year. He made many contributions to reactor design, and his frequent disappearances from Chicago masked a kind of detective game in pursuit of pure graphite and uranium. In the spring of 1943 the Los Alamos Laboratory was set up to design and build a bomb, but Szilard stayed in Chicago and had no part in planning the actual mechanism.

THE URGENT QUESTION

HE HAD long been haunted by the dread of hearing that an English city had been devastated by an explosion of incredible force. In the winter of 1944-45 this fear was replaced by another. What if the bomb were dropped, not as a defense against a similar weapon but upon Japan when her defeat seemed assured? It had been necessary to make a bomb. But was it now really necessary to use it?

In fact, Szilard thought, its use might enormously complicate our relations with other nations, especially Russia, and set off an arms race of terrible dimensions. These were the chief ideas he set forth in a memorandum addressed to President Roosevelt in March 1945. But before Szilard could see him, the President was dead. In May he presented the memorandum to James F. Byrnes—soon to be Secretary of State—but was met with utter incomprehension.

Szilard's concern was fully shared by some of his colleagues. On June 11, a month before the bomb was tested at Alamogordo, an informal committee, headed by the revered German physicist, James Franck, sent a carefully argued memorandum to Henry L. Stimson, Secretary of War, urging that the bomb's destructiveness be demonstrated on some uninhabited area.

The majority of the Franck Committee thought that in the atmosphere of wartime their plea would be more effective if it were based on political rather than moral argument. Although Szilard signed the report, he also drew up a petition to President Truman urging on moral grounds that the bomb not be used. Some sixty signatures were collected. When the Army tried to stop circulation of the petition in Chicago because it revealed that a bomb was being made, Szilard effectively protested, but at the other sites it was not allowed to circulate. Probably it never reached the President, either.

When the bomb was dropped on Hiroshima on August 6, and on Nagasaki three days later, those who had worked on it experienced a two-fold reaction—elation at their success in helping end the war, and horror at their part in mass destruction. Those who had tried to find an alternative felt only deep dejection and began to talk about a scientists' organization which might help insure that atomic power would be used for peace, not war. Such groups sprang up spontaneously at other Project laboratories, then merged in a national federation to promote international control of atomic energy.

The Army asked the scientists not to discuss the implications of the bomb, Szilard recalls—not saying why, but giving the impression that negotiations were going on among the U. S., Britain, and Russia that might be disturbed by public discussion. The scientists of course complied.

In September Szilard made a trip to Washington to find out what kind of thinking was going on, and there picked up a copy of the May-Johnson Bill. Back in Chicago, he was advised by a Law School friend that it was a bad

bill. Hearings before the House Military Affairs Committee took place while he was in Chicago and lasted only one day.

Szilard raised the alarm. With influential scientists like Harold Urey and E. U. Condon, he roused interest in an alternate plan for civilian control and returned to Washington for six months, on leave from the Project without pay, to promote it. He kept in touch with his young friends in Chicago, Los Alamos, and Oak Ridge whose program of public education played a vital part in the eventual victory for civilian control. However, it was Szilard's astute intervention that stopped the May-Johnson Bill from being passed by default. He once remarked to a friend that "baiting brass hats" was a favorite hobby. Certainly he had ample opportunity to practice it during his feud with General Leslie R. Groves, which reached epic proportions in the autumn of 1945. Wartime rules about what scientists in one category could discuss with those in another infuriated more tractable men than Szilard—but his protests were doubly offensive to security officers because in 1939 he himself had caused a brief furor by suggesting that publication of fission experiments be suspended. Now he complained about secrecy!

But Szilard's primary objective—getting a bomb before Hitler did—had not changed, and he later told a Senate committee that eighteen months had been lost because one part of the Project did not know what another was doing.

General Groves, on the other hand, charged that Szilard repeatedly ignored the rules. And he was further outraged that Szilard, without whom there would have been no bomb, now objected to using it. Szilard's direct appeals to the President violated every canon of military behavior, and his attack on the May-Johnson Bill added a crowning insult to a long list of injuries.

Nor had Szilard been an unalloyed joy to his civilian superiors, even though they too disliked secrecy and fully understood the value of his catalytic mind. They had to spend days meeting his demands for improved procedures and in explaining him to the General or his deputies.

SWITCHING TO A NEW CAREER

IN 1946 Szilard decided to do research in biology—a turning from death to life that seemed to reflect his deep revulsion after Hiroshima, though he himself says only that the new field offered the greatest intellectual challenge. In recognition of his concern for the political implications of the bomb, the University of Chicago gave him a joint appointment in the social and biological sciences.

Szilard's demands upon the university were modest. He wanted no big machines or corps of assistants; only a secretary, no teaching responsibilities, and a chance to travel. (Subsequently, his feats of ubiquity were to include a professorship in Chicago, a home in Denver, and a visiting chair at Brandeis while he was actually living in New York.) To insure his own freedom from restrictions, Szilard—with his special brand of guile and comedy—decided to apply for funds only for research already completed. Then he could use the money on new projects of his own choosing. (This system worked until an application was refused on the grounds that the experiment was impossible.)

He began his research with the assistance of a young chemist, Aaron Novick, and their work on the genetic characteristics of viruses quickly opened up important studies of mutations. They invented the chemostat, a device for growing bacteria and observing mutations under controlled conditions.

But his most important contributions are, as one man phrased it, "lost in a thousand conversations." The reputation of most biologists, as indeed of most scientists, rests upon one idea thoroughly developed; Szilard spews them out at the rate of a dozen a day and rarely exploits any of them.

Biology has attracted many alert young minds, and Szilard may find their *esprit de corps* like that of an earlier generation of physicists. However, his reception in the field has not been uniformly warm. His fundamental knowledge is not wide, as it was in physics, and he is unwilling to acquire it systematically.

At a recent summer conference in Boulder, his friends devised "the Szilard index" based upon the number of sentences a speaker could finish before Szilard got bored and—often rather rudely—walked out. His references to third-rate scientists and to the stultifying effect of excessive experimentation electrified a session. The more experiments we do, he said, the more stupid we can be. If we just keep on doing experiments it will take fifty years to solve the problems we are discussing, but if we stop and think how, for example, proteins might be synthesized we will see that there are not fifty, but perhaps five, possible ways. Assign probabilities to the five and it will take only a few experiments to distinguish them.

Often Szilard took refuge from meetings he found dull, on the roof garden where other

renegades soon joined him. There he sat under a large sun umbrella, notebook and slide rule in hand, apparently engrossed in his own work. But when the conversation around him touched an exciting technical problem, he suddenly offered pertinent suggestions or criticisms, then returned to his calculations.

"Why spend money on meetings?" inquired an admirer when this conference was over. "Just send people to talk to Szilard."

Biologists do not agree as to the value of his current work. One of his most provocative papers, for example, deals with the aging process. Some call his theory nonsense; others think it has revolutionary significance.

To Szilard, however, change is a basic tenet of life. "Devote six years to your work," he once wrote, "but in the seventh go into solitude or among strangers so that your friends, by remembering what you were, do not prevent you from being what you have become."

By design, he himself strikes no deep roots. "Leo's home," says a friend, "is wherever his intellectual interests happen to be at the moment." In recent years it has been at the faculty's Quadrangle Club on the University of Chicago campus; his room there is as devoid of personality as if he had dropped in overnight. He does not smoke, has little interest in alcohol, has never owned a car or a house. But his frequent travels, his lavish use of long-distance calls, and generous gestures made with a European sense of style have produced an erroneous impression of large private means.

His marriage in 1951 to an old friend of Berlin days, Dr. Gertrud Weiss, has not much changed his ways, although the periods when he takes his work to Denver, where she practices medicine, mean much to them both. There he keeps his recordings, chiefly Beethoven and Mozart, and—confuting the common belief that he never reads—a collection of his favorite books. They reflect a catholic taste: H. G. Wells and Shaw, *Tom Jones,* Boswell's *Johnson, Gone with the Wind, Sons and Lovers,* and the works of what he calls "English lady novelists."

RECIPES FOR TEA, RAZORS, TAXES, AND PEACE

HIS sudden arrivals and departures, his aversion for advance commitments, and his personal reticence are all a part of the oblique tactics in which he delights.

"Leo's technique in promoting one of his projects," says a lawyer friend, "is like a move in a billiard game where you hit one ball that hits another ball that drops seven in a pocket."

I well remember the chaos he created a few years ago in the office of the *Bulletin of the Atomic Scientists.* Szilard proposed to write a letter to Stalin. If it could be arranged for him to write to Stalin directly, the *Bulletin* would not print the letter; on the other hand, if official permission were refused, the letter must be printed immediately. Days were consumed in long-distance phone calls, in trips by Szilard to New York and Washington. Alternate articles were set in type and scrapped and the letter itself underwent ceaseless revision. Despite these exertions, the letter did not go to Stalin. It appeared eventually in a much delayed *Bulletin.*

All of which was something of an ordeal to its staff. But those who work with Szilard learn to be flexible, to be ready to drop yesterday's idea or procedure for one that seems (at least to him) more sensible today. This may entail retyping a letter fifty times because of a minor change—which a few associates have found insufferable. But many more have been firmly attached by his thoughtfulness, humor, and liberality with time and ideas. Szilard himself is mildly surprised by the prevailing human addiction to regular hours, schedules, and domestic obligations.

As in his work, he is unpredictable on social occasions. Inert and half asleep one minute, his conversation sparkles the next. With children and young people his magic never fails, whether he is doing bottle tricks for three-year-olds or counseling teen-agers about courses or careers. The proudest items in my six-year-old daughter's autograph collection were the signatures of Roy Rogers and Leo Szilard. His unpublished children's stories show a fine ear for the idiom of childhood and insight into its fears.

Szilard is something of an intellectual showman. For example, there is a story—perhaps apocryphal—that at lunch one day a young surgeon told him about a new operation, sketching the route of entry into the ear. "But why not go in this way?" asked Szilard. "By God," said the surgeon, "next time I will."

Sometimes he is occupied with quite trivial matters—how to speed up check-out counters in chain stores, a device for instant tea, the virtues of injector razors, or distributing copies of Dr. Spock.

On the other hand serious discussions on disarmament, freedom of research, new frontiers in science, acquire an extra dimension when Szilard takes part. If someone is accused of lunching with a Communist, said Szilard at a time when

flimsy charges were being leveled at scientists, we should all take him out to lunch; if he is charged with reading the *Daily Worker,* we should all read the *Daily Worker.*

Occasionally he will develop all on his own some sophisticated idea which had long since been laboriously built up by specialists in other fields—for example, floating exchange rates or the theory of imperfect competition. Some of his other inspirations are less impressive. He once wrote a memorandum proposing a dual currency, with green dollars for wages and red ones for credit in the bank.

Taxes fascinate him. He once consulted a tax specialist in the Chicago Law School on behalf of the *Bulletin of the Atomic Scientists* because its tax exemption was in doubt on grounds that it discussed political questions. Szilard proposed that its articles should not lobby *for* anything; they should simply attack the opposing policy. Thereafter he spent hours hunting new ways of obtaining personal or institutional exemption; he thought, for instance, that a university should raise money by selling its tax-exempt status. He never read the tax law, but he detected skillfully hidden loopholes, then triumphantly offered clever and subtle schemes for plugging them up —taking five minutes to dispose of a problem that had occupied the tax bar for five years.

To both economists and lawyers many of Szilard's schemes seem like devices—gadgets almost—to achieve a simple short cut. Sometimes he displays a remarkably rapid and accurate understanding of an intricate situation. They note, however, a final level of complexity and sophistication that Szilard often fails to reach—the level on which human beings operate. For example, his ideas on how to avoid taxes or finance a university, though legally impeccable, had a Rube Goldberg quality that would send shudders down the collective spine of a group of lawyers or a board of trustees.

This perhaps is why his foundations to administer science for the benefit of mankind remain a dream. Many responsible people do not like to be perpetually nudged into action; they need to be soothed and reassured, and Szilard is not the man for this. In the case of the May-Johnson Bill he made a superb gadfly, alerting scientists and the public to the danger of military control. But when it came to getting a substitute bill through Congress, those who could persuade and mollify were more effective.

Despite his gadfly quality Szilard can be patient and detached. For months he was preoccupied with a problem in biology; he worked constantly, and a tolerant neighbor at the Club often heard the bath water running at two and three in the morning. When the period of seclusion ended the friend asked how the research had come out. "Oh," said Szilard with complete composure, "it was not a good idea." During recent months of illness, this same detachment, salted with touches of ironic humor, has lightened the burden for those close to him and has at the same time moved them very deeply.

A GIFT FOR PROPHECY

APART from biology Szilard has devoted sustained attention since the war to population control. With a handful of young disciples he once braved a largely feminine luncheon of the Planned Parenthood Federation where a speaker described how beads used to keep track of infertile periods (in the rhythm method of birth control) tend to slip out of place. Szilard designed a clasp to prevent this and also proposed making it luminous. When asked how the Catholic Church regarded this gadget he replied smugly, "But these are fertility beads!"

Szilard has also taken a great interest in the *Bulletin of the Atomic Scientists.* In 1946, by persuading Einstein and other prominent scientists to make a nation-wide emergency appeal for funds, he rescued both it and the Federation of American Scientists from oblivion.

By far the most engrossing of Szilard's concerns has been international relations and the impact of the bomb upon them. He has written extensively on this subject for the *Bulletin,* often propounding ideas which are scoffed at as ridiculous, but have an odd way of looking like hard-headed realism within a few years. Early in 1947, for instance, he urged that the United States make outright gifts to develop consumer industries in Europe, the American reward to be increased trade. Three months later the Marshall Plan was announced. Similarly, his proposals that Stalin broadcast once a month to the American people and that the *New York Times* and *Pravda* carry exchange pages were less bizarre than the sight of a Russian premier eating corn in Iowa and American tourists swarming over Russia. He also foresaw Russia's reaction to our bomb and was one of the few leading scientists who accurately predicted the early date when the Soviets would have one.

Szilard complains that all methods of atomic inspection proposed so far have tried to solve a novel problem by pedestrian means. He tried out a more imaginative notion on a Russian

scientist at the Pugwash Conference last summer: If you believe Americans are unduly suspicious, he said, why don't you turn this erroneous belief to your advantage? Let America make all the inspections she wants—but charge a fee for each one of several million dollars. If an illicit test has taken place, Russia would have to refund all the fees paid to date and pay a large fine; if no test has taken place, the fee would be forfeited. Russia would not need to limit the inspections; our Bureau of the Budget would do it for her.

Political scientists may feel that Szilard betrays the scientist's weakness for mechanical solutions and that conditions which would make some of his schemes workable would also render them unnecessary. But even conservative internationalists concede the soundness of certain themes that crop up again and again in his writings: international agreements so framed that no participant will want to break them; large-scale exchanges of students; mass migrations of peoples so that national boundaries may some day mean as little as American state lines; and an informed and educated public.

Constantly he returns to the goal of mobilizing men of superior intelligence—in both East and West—to solve the problem of war and peace. After an abortive effort or two of his own to promote private discussions with the Russians, he was at last able to participate in such exchanges at the several Pugwash Conferences of scientists—the first held through the initiative of Bertrand Russell in 1955 at the Canadian village of that name, the most recent in Baden, Austria, in July 1959.

INTELLECTUAL WANDERLUST

I WAS once rebuked for speaking of Szilard's "non-scientific" interests. "Leo has no non-scientific interests," said my critic. "It is the essence of his endeavor to bring everything into the realm of science." This all scientists do up to a point—but the point varies, and few of them equal Szilard in the number of his concerns, or the consistency with which he applies his supreme faith that man's rationality is man's best hope.

Most scientists cling to the scholar's goal of learning more and more about less and less, and if they speak at all to non-technical questions they like to think that they do so from the firm base of a specialist's knowledge. Szilard, on the other hand, frankly offers advice about politics and social problems as a non-specialist who may for that very reason provide a new perspective. He likes to initiate a "chain reaction" by tossing out an idea or starting a project, then letting others carry on. But perhaps he himself does not entirely know whether this habit springs from his faith that human intelligence, properly directed, can alter society or from his magnificent intellectual wanderlust.

Has Szilard indeed played a unique role in the history of his times? Like most scientists he lacks the mystical quality, the desire to be a leader of men. His scientific contributions would have been made sooner or later by someone else. Even the building of an atomic bomb would have been proposed before long. But this is not the point. If Szilard does indeed belong among the illustrious it is not just because he was associated with one of the great events of history, the harnessing of atomic energy. To precipitate an event is not uncommon. But to show one's contemporaries its significance is to become a strong candidate for the company of the great.

PHILIP BOOTH

MAINE

WHEN old cars get retired, they go to Maine.
Thick as cows in backlots off the blacktop,
East of Bucksport, down the washboard
from Penobscot to Castine,
they graze behind frame barns: a Ford
turned tractor, Hudsons chopped to half-ton
trucks, and Chevvy panels, jacked up,
tireless, geared to saw a cord of wood.

Old engines never die. Not in Maine,
where men grind valves the way their wives
grind axes.
Ring-jobs burned-out down the Turnpike
still make revolutions, turned marine.
If Hardscrabble Hill makes her knock,
Maine rigs the water-jacket salt: a man
can fish forever on converted sixes,
and for his mooring, sink a V-8 block.

When fishing's poor, a man traps what he can.
When salt-rust speeds a Bangor hearse towards
death, the body still survives:
painted lobster, baited—off Route 1—
with home-preserves and Indian knives,
she'll net a parlor-full of Fords, and haul in
transient Cadillacs like crabs; Maine trades
in staying power, not shiftless drives.

Stenorette
Ry Re-listen

LEO SZILARD - Alice Smith Interview

I first thought of the possibility of the chain reaction in October of 1933. The occasion was a statement which Rutherford made at the British Association in '33, the fall of '33, in which he said that anyone who talks about liberating atomic energy on a large scale is talking moonshine. I didn't see how anyone can say with any degree of assurance since no one can foresee the inventions which might be made by others. I asked myself, is there some way in which atomic energy could be liberated - as I was waiting for the street light to change, standing on the curb of The street light changed to green and I started to cross the street, it suddenly occurred to me that if an element were found which emitted neutrons when it is bombarded by neutrons, say if it emitted two neutrons, then it absorbs one neutron, such an element could sustain a chain reaction if a sufficiently large mass of the element were assembled. Next I asked myself what element could have this property. What element could play this role? The first candidate for this role appeared to be beryllium. The mass of beryllium was such that it could have disintegrated spontaneously into two alpha particles and one neutron. Why it did not disintegrate in such a manner was not apparent. It was conceivable, however, that if the nucleus of beryllium were hit by a neutron, even a very slow neutron, {this / it would trigger the disintegration of beryllium and, that in place of the one neutron which disappeared, two neutrons and the alpha particle would appear.

For a while I planned to do the experiment and procured a large amount of beryllium and see if it would sustain a chain

reaction. I talked to several British colleagues about this possibility, among them, Blackett and G. B. Thomason. Blackett thought that it would be impossible to get financial support for such an experiment in England but a country like Russia would launch into experiments which are based on such a remote possibility. G.B.Thomason was also not very enthusiastic but I remembered that when he introduced me to Fermi in the fall of 1934, he mentioned that I had some fantastic ideas for nuclear chain reaction based on beryllium.

We know - the conclusion that beryllium should be instable and should be able ## spontaneously to disintegrate into two neutrons - into one neutron and two alpha particles, was based on the mass of helium as it has been determined by Essen. As it turned out later, this mass was too low and, in fact, beryllium is a stable element.

However, when I found this out, I did not give up the idea of - the idea that one ought to look for an element that could sustain a nuclear chain reaction by virtue of a neutron emission which might be excited by neutron bombardment. I was at a loss, however, to know just which element would fulfill/### these conditions. I vaguely suspected uranium because their instability through the emission of alpha particles, but the idea that idea that uranium or might undergo fission did not enter my mind.

In 1935, I spent some time in the United States and a colleague of mine - and I asked a colleague of mine to build me a linear amplifier which I wanted to use for examining one element after another in order to see whether any of them would emit neutrons when bombarded by neutrons. I took the amplifier with me back to England, but I was never able to get it to work. My colleagues seemed

No. Sorry.
still - I couldn't get any enthusiasm./ Then I talked to my physicist colleagues about the possibility of the chain reaction. I couldn't raise any substantial interest in the problem. I thought that perhaps chemists might be more approachable because there is something in chemistry which is called a chain reaction and so, by analogy, it might have been easier to chemists what the chain reaction might be. I thereupon asked for an appointment with Weissman whom I happened to know, explained to him the problem and told him that if he could raise 2000 pounds, or about $10,000, I would have an amplifier built and we could hire a young man and set him the task of investigating, systematically, all the elements for their ability to respond to neutron bombardment with neutron emission. I had not heard from Weissman but a few weeks later I heard from M who told me that Weissman had discussed with him this problem and asked his opinion and that he, , thought that this undertaking ought to besupported. This was the last, for the time being, that I heard. The next time I saw Weissman was in 1945 at the Wardman-Park in Washington after the

I said I did. "And do you remember what we talked about?" he asked. I said I did. "Well," said Weissman, "perhaps you will not believe me, but I tried to get you those 2000 pounds and I couldn't get it - and found that I couldn't get it."

New story: In 1932 I was in the United States and when I returned to Germany, where I was at the university, I knew what to expect. I lived at the which was the clubhouse of the Kaiser Wilhelm Institute in Berlin, and I had my suitcases packed and by this I mean I had literally

two suitcases were packed, with the key in the lock, so that I could leave Germany at any moment. After the Reichstag Trial, I decided the moment has come. I closed my suitcases and took a train to Vienna. It was a foregone conclusion that there will wholesale dismissals of the University Professors and, while walking the streets of Vienna, I met Jacob Mar who was in much the same situation as I was, having come to - with the difference that he came to Germany from Russia while I came to Germany from Hungary, and that he was in Heidelberg while I was in Berlin. I told Mar that some organization ought to be created that would find positions for those who will be dismissed from the German Universities and he responded by taking me to a friend of his, Schlesinger, who was a noted economist in Austria and a man of independent means. Schlesinger's response was to say that "Well, why don't we go and talk to Professor whose specialty was economic history and I don't know what other qualifications he had to deal with this problem. But, however that may be, we went to see Professor and said that just then Sir William Burbidge was visiting him in Vienna and then perhaps we ought to talk this over with Sir William . I asked him where Sir William B stayed and turned out that he stayed at the same hotel I stayed at, at the Hotel Regina. Then I volunteered to take over the matter with Sir found an immediate response. regarded also as a foregone conclusion that there will be wholesale dismissals and he suggested that I come to London and from time to time, needle him; he would be very busy, probably, for the next few weeks or months but, in

time, he thought, he could set up an organization that would do the job for England. When I got to London and contacted he told me that his schedule has changed, that he was not as busy as he thought, that he would be, and that he's prepared to go into action. This was the origin of the Economic Assistance Counsel in Britain. Let me add one sentence. The Economic Assistance Counsel adopted a policy of primarily helping the younger scholars and finding temporary positions for them in England. There was a parllel organization, a Jewish Committee, which adopted much the same policy. This was in sharp contrast to the policy adopted by those organizations in America, offered help to those who were dismissed from Germany Universities. ~~There were many~~ The American organizations preferred a man who had an established position and reputation and tried to find permanent positions for those.

Another story: I came to the conclusion that things will go wrong in Germany in the middle of 1930. This conclusion was based on rather minor signs which showed that something was not as it should be.

Another story: My visit to In the spring of 1945, when it was quite evident that the War in Germany had been won, I began to ask myself what we are going to do with the bomb which was being developed at Los Alamos. Since Germany was out - Germany had lost the War, it was evident that Japan was in no position to win it. And once a War is won, bringing it to a conclusion is no longer a purely military matter. There was no sign anywhere that the problem - that the existence of the bomb is bound to create for America and the World was being considered anywhere, was being

considered at the appropriate level in the Government, and it seemed high time that the consideration of this problem should begin in earnest.