



Oral History Heinz Lowenstam Paleontologist in Palestine 1935-36

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I have friends
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They will take
care of it."*

Heinz Lowenstam, professor of paleoecology, emeritus, was born in 1912 in Upper Silesia, in what was then southeastern Germany and is now south-central Poland—a region of coal, lead, and zinc mines, smelters, and steel mills. As a boy playing on the mine dumps, Lowenstam developed an interest in collecting minerals, and in high school switched to collecting fossils instead (which he also found on the mine dumps), which set him on a course to study paleontology. In high school he also heard a talk by Alfred Wegener, who first proposed the continental drift theory. Although the theory was not generally accepted for several more decades, the talk made a believer of Lowenstam and inspired his interest in geology.

In 1933, the year Hitler became chancellor, Lowenstam enrolled at the University of Munich, famous for its school of paleontology. He studied with Professors Broili and Dacqué and simmered under the growing antisemitism as the Nazis gained influence in the university. When Kölbl, a Nazi functionary and unknown professor from an Austrian agricultural school, became head of the geology department at Munich (and aghast to discover the presence of a Jew), Lowenstam finally boiled over and determined on a dramatic departure.

The following article was excerpted from a series of interviews with Lowenstam, who became known for his startling discovery, in the early sixties, of magnetite biomineralization, which was initially greeted with about the same skepticism accorded continental drift. Heidi Aspaturian conducted the interviews in 1988 for the Caltech Archives' Oral History Project.

Heidi Aspaturian: Wasn't it unusual for a Jew in Nazi Germany to write a PhD thesis on Palestine?

Heinz Lowenstam: Well, during one field trip with Kölbl in '35, there was a big discussion among the students, and he was pounding the table and saying, "German things must be done by Germans." A few minutes later, without even remembering what he had said, he said to me, "Don't you think it's time to think about the subject for your doctor's dissertation?" I was just boiling, and I said, "Yes, I want to go to Palestine and write a doctor's thesis on the subject of Palestine." He was ready to pounce on me. And then he smiled and said, "Okay." I remember coming home that night to the apartment in Schwabing, and my landlord, an American friend who published medieval manuscripts, asked me what I had done that day. Lately I had shot my mouth off at the university. So he would question me every evening about what I had said that day. Half of the time we would move at night; he was sure the Gestapo would come and pick me up. I could never keep my mouth shut. So, when he said, "What did you say today?" I told him, "I shot my mouth off, but I can't produce. I don't have the money to go to Palestine." He said, "Don't worry. I have friends in New York. They will take care of it."

So I went to Palestine for a year and a half. Earlier, when Edgar Dacqué and I had talked about possible thesis topics, he had said, "You want to do your dissertation on a paleontologic subject, don't you?" I said yes. He said, "No.

**Heinz Lowenstam in
Jerusalem, 1936.**

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Right: the eastern Nazareth Mountains on the southern border of Galilee; Lowenstam mapped their geology for his doctoral dissertation. Below: one of his Bedouin hosts.



You take an area and map the geology of it, including some volcanic and igneous rocks, if they are there. Then, when you have done all of that and integrated the geology and structure and history of the territory, then you do your paleontology." I don't know why I listened to him, but it was the best thing that ever happened to me. I learned the significance of field information, which today is widely abandoned in favor of the computer, which runs the same old data in new forms instead of giving new information.

HA: How long did it take you to make arrangements to go to Palestine?

HL: You know, I have no recollection. It was apparently fairly simple. I went on an Italian ship from Trieste to Haifa. The food was terrible. The rumor was that the ship might turn around any time and go back because the Italians had taken over Ethiopia, and there was the possibility that the British would react and there might be war. So there was a rather curious atmosphere.

HA: What was the topic of your thesis?

HL: The geology of the eastern Nazareth Mountains of Palestine. That is the southern border of Galilee, quite a bit below the Golan Heights. Actually, Prof. Picard of Hebrew University had mapped the western Nazareth Mountains. I thought it would be interesting to see the continuation toward the Dead Sea rift valley. That was the pivotal area, where the Emek region, which was on the valley border,



came up against the big rift that came from East Africa. It was very interesting to date some of the movements that took place.

HA: From a paleontological standpoint, were you looking at the fossils in the area as a means of dating?

HL: Yes. I used the fossils for correlation and age assignment. I could use the fossil content and see how it correlated with other areas in Egypt and in the Balkans. Some fossils would even correlate with Bohemia, in central Europe.

HA: Where did you live during this period?

HL: I started off in the Emek in Kibbutz Gin-negar, which had just been founded. We lived in tents, in deep mud—it was the rainy season. It was miserable. I used that as a base. I did everything by foot, initially, later by horse and donkey. And from there I moved up to Kafr Kana, to the Greek Orthodox monastery. If you paid a little bit, they took you in. The Roman Catholics, across the alley, wouldn't take me, but the Greek Orthodox did. Their main interest was that one of the flock, one of their people, would be my guide. I would pay him for that.

HA: Did you speak Hebrew or Arabic?

HL: No. I learned Arabic in the end, when I lived among the Bedouins. From Kafr Kana, I moved to a settlement that was founded by Baron Hirsch for old Jews who came from Europe to die in Palestine. It was a very weird place. From there I moved to the Bedouin camp behind Mount Tabor for about two months.

HA: What prompted you to move to the Bedouin camp?

HL: Well, I was always advised by the British district commissioner—this was the period of the British mandate. He was an exceptional person. He was interested in the people he administered, and he spoke Arabic. He was a friend of the Bedouin sheik. And when I told him I was going to map that area, he said, "Well, you have two choices. You either need to have police protection—the Bedouins are very good shots—or, since I'm a friend of the Number One sheik, you can live with them. You are my friend and he is my friend, and you will become his friend." I decided it was much more romantic to live with the Bedouins, and that's where I learned Bedouin Arabic in a hurry. I'm very poor in languages, but I learned very fast because there was no other way to communicate.

HA: What was life with the Bedouins like?

HL: At the beginning it was very difficult. I almost left because I was literally covered by fleas and I didn't sleep for four nights. By the time I decided I couldn't take it, they suddenly decreased. I got some kind of an immunity perhaps. No medical people believe it, but I know it from experience. My flea-population density went way down. So I stayed, and I learned Bedouin Arabic.

It was a very tight society of people living in subgroups. We lived in tents. When I arrived there, an Arab police officer took me over. All the way, riding to the tents, he

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tried to talk me out of going. He said, "They are pigs; they are dirty. You can't live with such people; they aren't even people; they're animals." The peasants were all against the Bedouins, because Bedouins would drive their herds any place, and the townspeople, like this officer, looked down on them. So we arrived. The sheik came out and had a rusty can of camel's milk, and he rolled this cigarette and licked it and handed it to me. Apparently I tried to step back involuntarily. The officer stuck his thumb into my back and whispered in my ear, "If you want to get killed, you asked for it. I don't want to; you take it." So there was always this real division. The Bedouins actually lived a very natural life—I thought they were doing very well. They had little huts. Once at the beginning I asked if they would sleep in them when it rained, and they thought it was very funny. They would suffocate, they said. The huts were for the goat cheese, which was their currency.

In time I learned Bedouin Arabic and even wrote some petitions for them to the district commissioner. They asked me to; they could not read or write. The sheik's oldest son was my guide. When I was out in the field, we always stopped at ruins—"tels"—because the British insisted that I was looking for antique stones—I wasn't doing geology.

HA: Why did they insist that?

HL: They were worried because oil had been found in Palestine in one spot. It later turned out not to be much, but they kept it to themselves. Everybody anticipated that the coming

war would affect Palestine in a major way, and they were afraid if it was now known there was oil in the area, things would be even worse. They wanted nothing to do with it. So usually, while I worked in the mountains, the peasants would bring me amulets and coins and give them to me. I had a fantastic collection of coins going back to Maccabean times. Every time I came to Jerusalem, E. L. Sukenik, the first director of the Palestine Museum, which later became the Israeli Museum, would go through my collection and say, "Oh, we don't have this coin," or "We don't have this amulet." And I would give them to him.

The nice thing about it was that all I brought back to Germany were the dregs of the collection. When the Nazis confiscated what was left of the collection when I left the country, I almost laughed because they only got the things not wanted in Palestine.

That reminds me of a funny story. One day when the sheik's son took me out, we crossed the caravan route and a caravan came; and the son of the sheik knew the guide of the caravan. They greeted each other for about half an hour, asking about everything except your family—that comes as just barely a trace at the end. They didn't realize I could understand by then. So the other fellow said, "What are you doing with this character? What's he doing?" "Well," the son said, "You know, he's a nut, but he's harmless. He comes to us; he tells us he is looking for antique stones. So what do I do? I take him to the tels, the ancient ruin hills, and he picks up something, and when he thinks I don't



Far left: An Arab peasant with a camel hitched to his plow. Such peasants supplied Lowenstam with a "fantastic collection" of ancient coins. Center: A Bedouin tent. Left: During the disturbances, a British army detachment "rescued" Lowenstam from the Bedouins.

see him, he throws it away. Then he goes out into the deserts here and breaks up rocks with his hammer." The other one shook his head, and the son said, "But he's harmless, you see."

HA: Was there anyone among the Bedouins who was interested in what you were really doing?

HL: There could have been, but since I lived with the Number One sheik I had no way of finding out. I was with the top level. It was very interesting. The father of the sheik, a very old man, realized I had trouble, couldn't communicate—so he took me by the hand at the beginning. He would take me out and show me how to find things, something to eat and drink. I still had a few oranges with me, but when they ran out, I had nothing to drink. He taught me to pick up certain tiny plants that one could hardly see. You chewed them and went all day without being thirsty. Occasionally we would hit a waterhole. When we hit the waterhole the horses, the camels, everything would go in. I drank the water through a handkerchief.

One thing the district commissioner insisted on was, to the Bedouins I was a German. As a matter of fact, one day while we were in the camp, somebody behind me started to speak in Schwabian. I turned around and looked, and all I saw was an Arab. They had brought in one from the German Templar colony, in the Haifa area, to check if I really was German. They didn't suspect that I was a Jew, but to them I was a foreigner.

HA: Did it excite you to be in Palestine because of what it was historically?

HL: Yes, certainly it was exciting. Later I was in Jordan and unofficially in Saudi Arabia. It was unofficial because the British had officially confined me to Jerusalem. That happened because when I lived with the Bedouins, disturbances between the Arabs and Jews broke out. I didn't know about the disturbances because it was perfectly peaceful where I was. But one day a British army detachment appeared at the camp looking for me, dead or alive, because I was supposed to have been killed by the Bedouins.

HA: How did this rumor get started?

HL: My letters didn't go through. The runner who was supposed to take them somewhere apparently just threw them away after a while and then went home. I don't know why the British were interested in me—through the Iraq Petrol Company, probably. At any rate, the detachment grabbed me, and they did the craziest thing. Below the escarpment in the valley, there was the Khaduri school, an agricultural Jewish school that had been evacuated. They dumped me there, where there was one British officer. And he was scared to death. He taught me how to handle rifles. We were standing guard day and night. This was to save me. I'll never forget that one night, I heard something coming, and I shouted, and it kept coming, and I shot it, and it stopped. The next morning, we found a dead ass.

HA: Were most of your relationships with the



Above: Lowenstam with his friends in Jerusalem. Far right: Camels and steam engines were both popular means of transportation in Palestine in the thirties.

sabras, or with British officials, or did you pretty much associate with both groups?

HL: All across. Some of my old friends, from childhood way back, were living in the Moshavim, privately owned Jewish settlements in the Emek, and I was in contact with the kibbutz residents and the Arabs.

Once while I was mapping the Nazareth Mountains farther west, I came upon a huge Persian carpet spread out and people sitting on it and people fanning people, and food all over. They were the Arab landowners, who had come home from Monaco and Nice because they had run out of money. They were waiting for the peasants to bring in the harvest so they could take three-quarters of it to finance going back. They thought I was a big joke. They said, "You mean to say you are here voluntarily?" I said, "Well, in a way I am." And they said, "It doesn't make sense." They often invited me to their places. So I even got to know the old Arab gentry who had sold land to the Jewish National Fund.

HA: How were your relations with the British officials? What were your impressions of them?

HL: Most of them were narrow-minded. It often turned out, as I got to know them better, that they were either the third sons or they were people who had done some minor thing that wasn't quite on the level, and the family wanted to have them disappear. So they went into the colonial army. That was the bulk of those people—the lowest possible excuse to go.

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They were not interested in the country and the people at all, with rare exceptions, like that district commissioner I knew. He had an interest in people in general, so he enjoyed what he was doing and he helped me a great deal.

While I was at the Khaduri school with the terrified officer, my notebooks and the collections I had made in that area were still in the Bedouin camp. The army detachment that had picked me up was like the harbor dregs of some British city, the worst people. I couldn't get across to them that I had to get my collections back and take them with me. I knew I was in danger because now the Bedouins were thinking I was a British spy, so I tried to get the officer to ride up and pick up my things in the camp. But he wouldn't go. One day I noticed that the Bedouins had all moved north to what I knew was a central meeting ground. As I found out later, they were having a gathering of the sheiks to decide whether or not to join the disturbances. When I saw that, I said to the officer, "I know how you can get up in the ravine and come right to the tent of the sheik I lived with, which was at the edge of the cliff. I know where my things are, if they are still there." I finally convinced him. We came up on two horses, and the Bedouin guard didn't know what to do because he had no instructions. So I had time to see that nothing had been touched. I could identify the most critical collections from the bags' markings, and Arab horse saddles are very wide. I stuffed the material in, got my notebooks, and rode out.

Then came another British detachment that had orders to take me to Jerusalem. So I came back to Jerusalem. I was not supposed to leave the city. They caught me a couple of times down at the Dead Sea and other places. In the meantime I had joined the Hagana—the Jewish underground army. I lived in Talpiot, which was in those days a peninsula most likely to be attacked. My closest friend lived there, and his brother, a telephone lineman, was killed by the Arabs. There were other things going on. At night I was in the Hagana. That was a tricky business, because after dark the British had imposed curfews. So we had all our guns taken apart and carried the pieces and slipped into our posts and assembled our weapons.

HA: What do you remember about the Jewish settlers at that time?

HL: I was most interested in the ones around the southern end of Lake Tiberias—the Sea of Galilee. They had lived there for almost a generation and a half. I met many of the leading people then, and they were quite interesting.

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They were unhappy about one thing. They were proud of what they had achieved—all the orchards and the agricultural development—but they said their children were like big cows. They had no interest in literature, in music, in culture; they were just peasants. This intrigued me very much.

HA: How did you communicate with these people?

HL: Mostly in German—I didn't know much Hebrew—and French, and some English, but not very well.

HA: Was there a general lack of contact between the Jews and the Arabs?

HL: Yes and no. Yes, in the sense that it was real, but no in that it wasn't the Jews who tried to keep apart from the Arabs. They initially had Arab guards, but they killed and did other things. So then the kibbutzim and the moshavs started having their own guards.

When I mapped the highest part of the Nazareth Mountains, there was a little Arab village. I knew the mayor of that town. I don't know how we communicated, but we communicated very well. One day he said to me, "I want to go down to the Emek, the Esdralon Valley to the central town of Afula there and get something at the post office." So we came down on two donkeys, riding side by side. He had never been there. It was the first time he had ever needed the post office. The mountains were very austere—like the desert—and his eyes got bigger and bigger when he saw all the green, lush fields

in the valley. He said, "Who owns that?" "Kibbutzim." "Who are they?" I said, "Well, those Jewish people." He said, "Think what we lost." I said, "Now wait a minute. You see over there—that's an Arab cemetery. There were very few Arabs living here and they died from malaria. And then the first generation of the Jewish settlers who drained the swamps died from malaria." That didn't impress him at all. He said, "But look what's here!" In his mind, what was there had nothing to do with what it was before. His attitude was, "We don't have it; we live in the mountains." He could only see what was there now, and that's what counted.

Also, when I lived among the Bedouins, the British high commissioner made a speech after the disturbances had broken out. A runner came and reported on it, and it sounded to me like a great speech. He tried to say, "Look, we are thrown together here—Jews, Arabs, British. Let's make the best that we can make of it, instead of fighting and killing each other and making it difficult. Maybe we can help everybody in some way." And those sheiks were just rolling on the floor, holding their sides, laughing. I said, "What's so funny about it? That's a very sensible thing."

They looked at me like I was loco, and one of them said, "I'll tell you a little story"—that's how they would always answer. "The Turks occupied this country. One day a Turkish soldier was killed during my father's reign. What did the Turks do? Nothing. In half a year a Turkish regiment came. The chief officer was quartered with my father, and so on down the

Bedouins herd their sheep by Lake Tiberias (the Sea of Galilee). Far right: Aqaba, Jordan's only port on the Red Sea.



line, down the social ladder of the Bedouins. They had a wonderful time slaughtering sheep, having big parties. And suddenly we realized, 'If this goes on, they will destroy our livelihood. We will starve to death.' So my father and his buddies got quietly together and decided to turn over the man who had killed the Turkish soldier. You know, the Turks had an awful time finding a tree, but they found one. They strung that guy up and marched off." He said, "You see, Britain is weak. Britain is talking." And that's the whole story today, ever since. Only power and might are important. That's the sad part of it.

HA: Do you recall how the Jewish settlers felt about the British mandate?

HL: It was of no concern. Life was so hard, to just survive. They had very little to eat. The top-level Zionists in the Ginnegar kibbutz were just complaining and talking. It was the others who came from Eastern European countries, Germany, and Austria, who were really doing the tough work. At that time the Zionists were really looked down on—Zionism was all right for the salon but not for the daily life of existence. It was really interesting, because many of the younger people were not Zionists at all. They came there; they took it for what it was and tried to survive.

HA: Do you recall any discussion about the situation in Europe?

HL: No. The concern was more that there might be war in the Mideast, because, you see,

Haile Selassie, the Ethiopian emperor, was in Jerusalem. As a matter of fact, when I was confined to Jerusalem, I lived a block away from Haile Selassie and his court, and I went with him and his prime minister and several other ministers every day on the bus to town. He never saw anybody. He looked through people. The situation was very volatile. It looked like a British-Italian war, initially, in that part of the world. It looked like it could be any time, so we were more concerned about the local situation.

HA: What did Jerusalem look like in those days?

HL: There was the old city, and then there was the new adjacent part of Jewish Jerusalem. Living was very simple. I tried several times last year when I was there—I go every other year to the Weizmann Institute in Jerusalem—to locate where I lived in Talpiot. I was finally told by somebody who knew the area that all of that had been razed, and there are modern apartment buildings and more expensive villas substituted for the simple buildings. We had a very small, simple house, where I stayed with my friends.

HA: Did you meet any of the other faculty or intellectual leaders of the area?

HL: I met some in connection with a petition that the president of Hebrew University wrote, calling for Jews and Arabs to live together in peace. There were problems at that time, not only with the Arabs, but with the people in Tal-



Suddenly he got all excited and he had a vision. He said, "This is the end. This land will be taken over by the Jews." That was in '36. They thought he was out of his head.

piot who were "Jabotinsky boys"—members of the Irgun. I was one of several hundred people who signed that petition.

HA: Did you have any associations with people in archaeology or anthropology?

HL: Yes. The French consul was an anthropologist from the Sorbonne. Whenever I came to Jerusalem from the country, he would always have me over and discuss things because I knew Sukenik—the Jewish archaeologist who got all my collections. He asked me to keep an eye out for any likely places where there might have been human habitation. So, when I mapped the cave area at Jabal Kafsi, near Nazareth, I often had lunch in the cave entrance because there were no trees. That was the only place in the heat to get some shade, and to rest for a short time. I would pick up stone implements in some areas, scrapers in others. When I told the consul, he wanted to see them and then to keep them. That was the last I heard of him until after the war, when I got a monograph from the Sorbonne describing how he had excavated the Kafsi cave and found a Neanderthal woman skeleton with a stillborn baby skeleton next to it.

Also, when I lived with the Bedouins, there was a cliff facing the east. That region was all lava fields from the outpouring of the rift valley. The cliff was 50 percent limestone and 50 percent flint, and the whole slope was literally strewn with human artifacts. So in the evenings, when I rode back to camp, I would usually stop before it got dark for 15 or 20 minutes and pick up some of the implements. One time I

brought one back to Sukenik that wasn't complete. He took one look at it and said, "You see, these kinds of markings are Paleolithic; these were done by a Mesolithic apprentice; and these were done by a Neolithic apprentice. They would use the broken pieces to practice the technique of making implements." I had a fantastic collection of them.

HA: Did you ever meet Ben Gurion, or Weizmann, or any of those people?

HL: I met Ben Gurion in a group at Bet Alpha, at Lake Tiberias, one of those famous kibbutzim where they talked about their children being like cows. He came in and he shook hands with everybody. Then they had something to discuss. But there were so many of the famous old-timers there. I forget the names. They were really interesting people. We talked about philosophy and other things, but not about the political situation.

I remember one other thing that was really intriguing. When I worked at the highest, very scenic, tiny Arab village at the top of the mountains, at lunch we would sit down. The men and my guide would sit down with me. The peasants who were plowing would sit down. But the women had to go on plowing; they didn't count. One day an old blind man came down, guided by some kid. He heard me talk. In the mountains I wasn't supposed to talk—a foreigner. And they didn't know I was Jewish. Suddenly he got all excited and he had a vision. He said, "This is the end. This land will be taken over by the Jews." That was in '36. They thought he was out of his head.

[Lowenstam returned to Munich, where his dissertation was accepted and a date set for his doctoral examination. A week before the exam, a law was passed prohibiting Jews from earning doctoral degrees. In 1937 Lowenstam left for the University of Chicago, where he earned his PhD in 1939—and made a surprising discovery.]

HL: While I was at Chicago, every so often oil companies would send people over to inquire about students who were interested in jobs. I was never interested. But the department chairman took my thesis to the company geologist of Socony Vacuum, and later told me what happened. The geologist took one look at the title and said, "Oh, that's old stuff. I don't want to see it." "Is anything wrong, sir?" The geologist said, "Oh, no. But we already have not only his notes from Palestine; we have the notes he made in Jordan and in Saudi Arabia. He never knew that he was a leg man for us; we financed his

Lowenstam with a tankful of chitons in his Caltech lab in 1963 (right) and in 1983 (left).



work." So my landlord in Munich—the one who published books of the Middle Ages—somehow had connections with the oil companies. Socony Vacuum was a subsidiary of Iraq Petroleum Company. And that's how he financed my trip to Palestine. Up to that time I had never realized why I kept running into geophysicists and geophysical crews the whole time I was in the Middle East. They obviously knew where I was, too, which amazed me, and they were always so nice.

Oil companies continued to follow Lowenstam around (and to fund his research), especially after he discovered that Silurian coral reefs were associated with deposits of oil. He worked for the Illinois State Museum and the Illinois State Geological Survey before returning in 1948 to the University of Chicago to work with Nobelist Harold Urey and Sam Epstein, now the Leonhard Professor of Geology, Emeritus, using isotope chemistry to determine the temperatures of ancient oceans. Geochemist Harrison Brown recruited Lowenstam and Epstein to Caltech in 1952, part of a raid that resulted in a group in geology known as the Chicago Mafia.

At Chicago Lowenstam was called a biogeochemist, but he came to Caltech as a professor of paleoecology, which he described as: "When you want to do anything you want without having to justify it, you call it paleoecology." Lowenstam did what he wanted, which was not always in the mainstream. Sometimes he also referred to himself as a "professional beachcomber," and liked to claim

that his most interesting discoveries were the result of serendipity rather than the "scientific method."

His long-time interest in carbonate marine fossils found him in 1961 on a calcium carbonate (limestone) reef in Bermuda, where he was studying algae, whose skeletons he suspected as the source of some crystalline needle sediments. As he rested by a tidepool, he noticed a slug-like beast called a chiton carving chevron-shaped markings on the smooth pool bottom with its teeth. "And I saw that they were clearly indented into the limestone, which meant that the teeth of these beasts had to be harder than limestone." X-ray diffraction proved it to be magnetite. His colleagues joked that the chitons must be eating magnetite, but Lowenstam dissected the animal's tongue plate and observed where the teeth were mounted. "You could see the whole development—how it was being mineralized. I was quite sure on the basis of that that it came from inside the animal and couldn't be extraneous material." Although Lowenstam published his findings—that chitons had "iron teeth"—in 1962, the discovery that animals can actually manufacture such minerals wasn't accepted until 1975, when evidence of magnetic bacteria confirmed it. Since then creatures from tuna to pigeons to bees have been studied for their magnetite-making capability and use of the earth's magnetic field.

Although he has traveled widely, mostly to islands and reefs, the "father of biomineralization" did not return to Germany until 1981, when he was awarded an honorary degree from the University of Munich. And last spring he finally revisited his hometown in Upper Silesia. □