A German Professor's Trip to El Dorado

Ludwig Boltzmann

Citation: Physics Today **45**, 1, 44 (1992); doi: 10.1063/1.881339
View online: https://doi.org/10.1063/1.881339
View Table of Contents: https://physicstoday.scitation.org/toc/pto/45/1
Published by the American Institute of Physics

A GERMAN PROFESSOR'S TRIP TO EL DORADO

Boltzmann spent the summer of 1905 smuggling wine into Berkeley, dining at the elbow of William Randolph Hearst's mother and generally having a wonderful time in California.

Ludwig Boltzmann
Abridged and translated by Bertram Schwarzschild

Ludwig Boltzmann was born in Vienna in 1844. In 1905, when he was professor of theoretical physics at the University of Vienna, Boltzmann was invited to give a course of lectures in the summer session at the University of California in Berkeley. His recollections of that summer survive in his well-known popular essay "Reise eines deutschen[1] Professors ins Eldorado," which we present here in an abridged translation by PHYSICS TODAY *Associate Editor Bertram Schwarzschild. Its lively, humorous tone is hard to reconcile with the tragic fact that Boltzmann took his own life at the end of the next summer (5 September 1906) while he was on vacation near Trieste. He was given to periods of depression and his health was failing. He had made an earlier suicide attempt when he was professor at Leipzig (1900–02). It has been speculated that the acrimonious rejection of his statistical mechanics by Ernst Mach, Wilhelm Ostwald and the other "empiricists" who objected to the invocation of atoms and molecules contributed to his suicide. Ironically, Boltzmann died just a year after the publication of Einstein's first paper on Brownian motion, the harbinger of Boltzmann's ultimate triumph.*

Having been to Constantinople, Athens, Smyrna and Algiers, and several times to America, I've been urged repeatedly to publish accounts of some of my travels. But it all seemed to me too insignificant. My recent trip to California, however, was something quite exquisite. So I will venture a little chat about it.

I certainly don't claim that you have to journey to California to see interesting and beautiful sights, or to have a good time. Walking in the lovely mountains of our own fatherland, one can experience as much pleasure and joy as the heart can hold. A simple meal can make you as happy as a king. But a visit to California is oysters and Veuve Cliquot champagne.

The first part of my journey was rushed, so that's how I'll tell it. Even on 8 June [the day of departure], I attended, as usual, the regular Thursday meeting of the Vienna Academy of Sciences. After the meeting a colleague, noting that I was not heading toward Bäckerstrasse, my usual route, asked where I was going. "To San Francisco," I answered laconically.

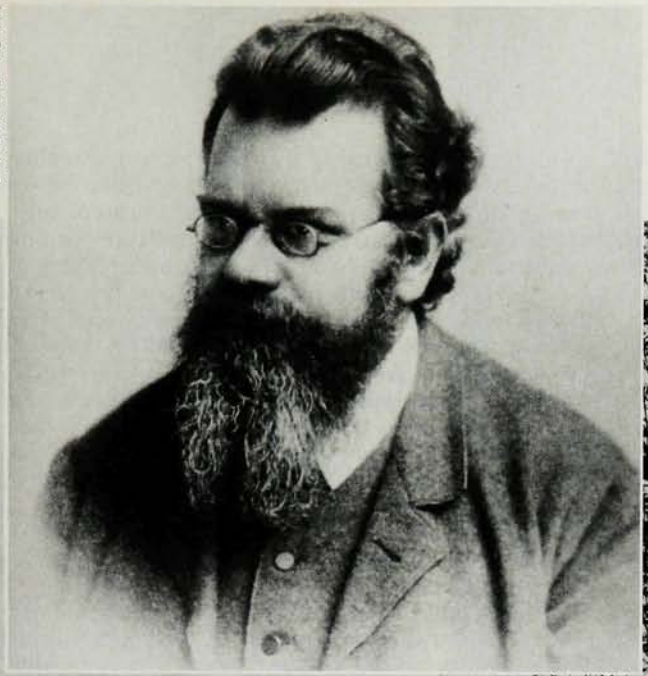
There was still time to enjoy a relaxed meal of roast suckling pig with cabbage and potatoes in the restaurant of the Northwest Railroad Station. My memory for numbers, usually quite good, is always bad at recalling the number of glasses of beer I drank.

No reasonably experienced traveler will be surprised if I dwell upon food and drink. Far from being an insignificant factor, it is pivotal. The most important thing on a journey is to keep the body, and above all the stomach, healthy in spite of the whole manifold of unaccustomed assaults it must endure. This is especially true for the pampered Viennese stomach. No Viennese can eat his last goulash with *nockerln* [little dumplings] unmoved. . . .

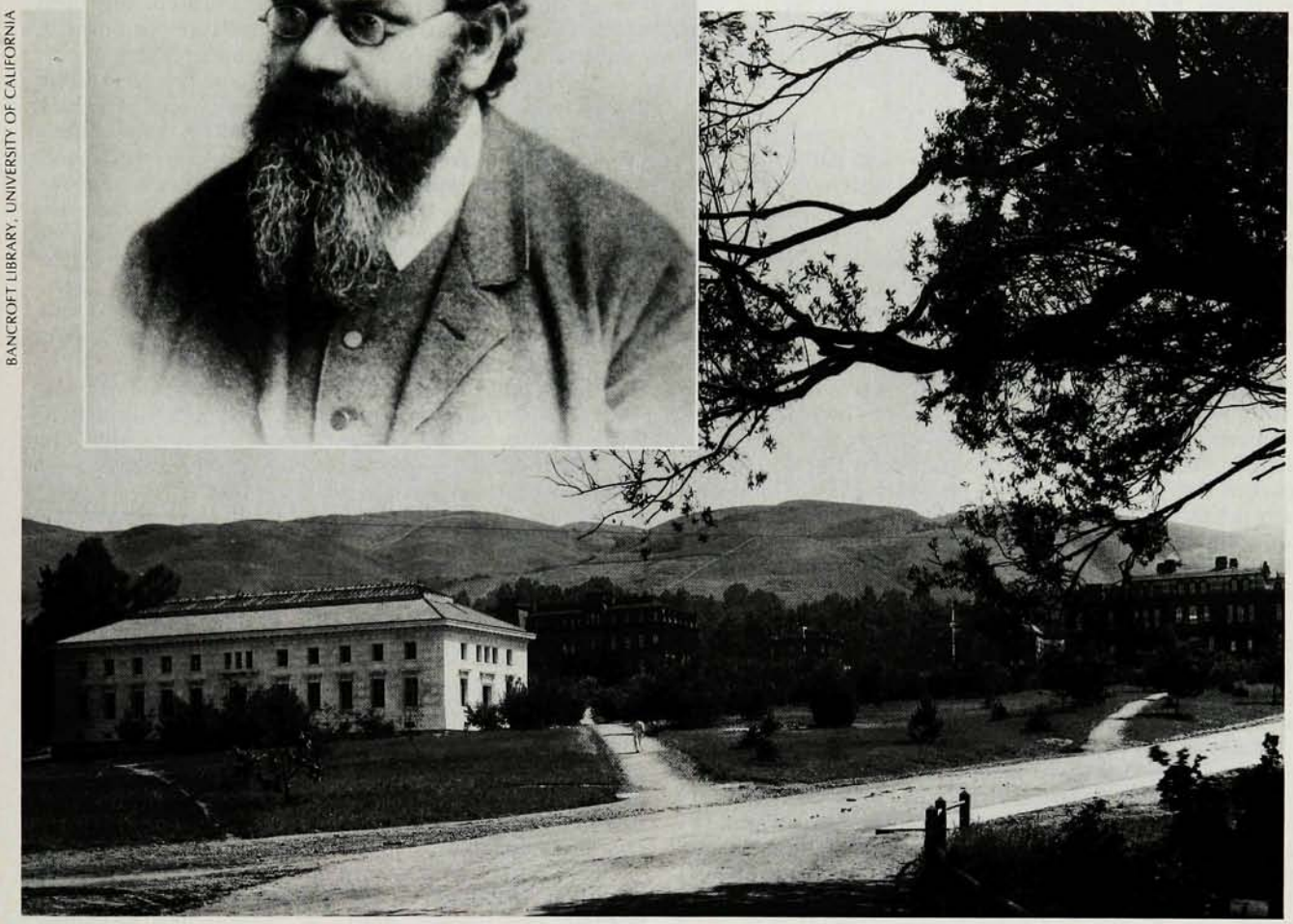
When I had finished my dinner, my wife and children arrived at the station with my baggage. We made our farewells and I was off, first to a meeting of the Cartel of [scientific and learned] Academies that was to begin at 10 o'clock the next morning in Leipzig. . . . I went to these cartel meetings with some trepidation, because there was a subject coming up for discussion that might be extremely unpleasant for me. . . .

Several German academies and learned societies joined together to create this cartel for the purpose of convening annual meetings to discuss important matters of common concern. Some years ago the cartel undertook to provide financial support for a major project: an encyclopedia of the mathematical sciences. The scope of mathematics has grown enormously in the last century. In this proliferation, every author uses his own peculiar notation, often writing so opaquely that only his closest colleagues can, with great effort, follow his meaning. Nonetheless, a great deal that is useful for pure and applied mathematics, indeed well nigh indispensable, lies buried and often almost impossible to retrieve in this Babel of literature scattered throughout the world. . . . The need for an encyclopedia that will summarize the mathematical literature is so urgent that Professor [Felix] Klein of Göttingen has called it a mathematical public lavatory. [In German the euphemism is *Bedürfnissanstalt*, literally "institution of necessity."]

. . . When Klein asked me to write an article for the encyclopedia, I hesitated for a long time. Finally he wrote to me; "If you don't do it, I will assign it to [Ernst] Zermelo," a man who represented the position diametrically opposed



UNIVERSITY OF VIENNA



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Boltzmann and Berkeley. Boltzmann (shown at left in 1904, when he was 60) spent the summer of 1905 teaching at the University of California in Berkeley (below). In this 1906 view of the campus, which Boltzmann describes as "the loveliest place one can imagine," the newly built California Hall is on the left.

to my own point of view on the subject in question. Lest Zermelo's opinion become enshrined in the encyclopedia, I [accepted the assignment] at once. . . .

. . . With a sure psychological aim that philosophers would envy, Klein strikes each intended victim at precisely that sore point where he is most vulnerable to persuasion. What motivates Klein? Only idealism. And if we open our eyes we find idealism everywhere, all the way to the Pacific Ocean. Near the California coast we are greeted by the two white towers of the Lick Observatory, the work of an idealist and hundredfold millionaire. More of that later. I have often asked myself which is the more remarkable fact about America: that millionaires are idealists, or that idealists become millionaires. What a fortunate land! . . .

Crossing the ocean

. . . [From Leipzig] I moved on to Bremen, and then to New York with a Hohenzollern prince. Not that I had the honor of accompanying this nobleman on a transatlantic voyage; rather, he simply carried me over on his back: It was [the steamship] Kronprinz Wilhelm on the crossing to America, and [the] Kaiser Wilhelm II on the way back.

I may be in a hurry, dear reader, but I couldn't possibly dispose of an ocean voyage from Bremen to New York with that lame joke. The great ocean steamers are among the most admirable of human creations. I find each new journey on one of these great ships more beautiful than the last. The wonderfully turbulent sea, changing every day, and every day more amazing! Today it's foamy white in wild ferment. Look at that ship over there! Now it's been swallowed up by the waves. No! A moment later the keel bobs up victorious once again.

. . . On occasional special days the sea adorns itself with its loveliest garb: its ultramarine blue dress, a color so dark and yet so luminous, trimmed with a lace of milky foam. I once laughed when I read that a painter had spent days and nights trying to reproduce some particular color. Now I no longer laugh. The sight of that ultramarine blue sea actually brought tears to my eyes. How can a mere color make us cry? . . .

If anything can be more worthy of our admiration than such beauty of nature, it is the human ingenuity that has so completely vanquished the limitless sea in a struggle that goes back far beyond the time of the Phoenicians. . . . Surely the greatest wonder of nature is the resourceful human mind.

If I, like Solon, were asked who is the most fortunate of all mortals, I would without hesitation name Columbus. Not that no other discovery ever equaled his. We need

only consider the great invention of Gutenberg, the German. But sensory impact also makes a contribution to happiness, and for Columbus this must have been of the highest order. I can never land in America without a certain envy of Columbus, or perhaps it is better described as a feeling of bliss at being able to experience a small part of his joy. . . .

When we enter New York harbor, I am always seized with a kind of ecstasy. These towering buildings and, dominating it all, the Statue of Liberty with her torch. All this accompanied by a cacophony of ships piping and singing: one sounding a harsh warning, another responding with a surprised shriek, a third piping gaily and still another wailing in melancholy fourths. The inimitable Siren song! If I were a musician I would compose a symphony: The Harbor of New York.

But now there was no time for sentimentality. Having docked in Hoboken, I immediately hired a cab, which was supposed to take me first to the office of the Southern Pacific Railroad and then directly to the railroad station—all for $3. But at the Southern Pacific office I learned that the express train, for which I had a reduced-fare ticket, only goes twice a week. I would have to wait two days in New York. So I redirected my cab to the Westminster Hotel, and now I had the leisure to loiter about the city for two days.

New York is certainly not boring. What a rich panoply of sights and entertainments is afforded by a simple trolley ride. They don't issue trolley tickets, there's no prohibition against overcrowding, and the fare is independent of distance. With an eagle eye the conductor spots each new entrant. The passenger hands him a nickel and the conductor pulls a cord that sounds a bell and registers the payment on a counter overhead. If you manage to get a place near the driver, you can admire talents of leadership [a play on the word *Führung*, which means both leadership and driving] that cannot be much inferior to those of a Napoleon I or a Moltke. . . .

Crossing the continent

. . . I made it from New York to San Francisco in four days and four nights. You're simply catapulted. The jolts you endure making your way through the interminably long train to the dining car or the rear observation car are not exactly pleasant. The observation car is completely open at the back. You can sit on the rear gate, or lean over it, taking care not to be tossed out by a sudden jolt.

The landscape was mostly monotone, but the direct experience of speed is interesting in itself. When you look out the back, the rails seem like an endless ribbon that's being pulled out from under the train with frantic speed. Also interesting was the ride over the gigantic wooden trestlework across the Great Salt Lake, and the salt-covered expanses nearby that looked like fields of snow. The crossing of the Sierra Nevada near the end of the journey is wonderfully beautiful. It reminds me of the Semmering [south of Vienna]—not quite as picturesque perhaps, but the Sierra range is far more extensive and its peaks are much higher.

Because of the delay in New York I was late arriving in Berkeley. I didn't get there till the the evening of 26 June, the day on which the summer school began. But because this first day had been taken up with registration, introductory talks and the like, I wouldn't have missed any of my scheduled lectures if I could have started the next morning at 9 o'clock. But I declared myself to be in no fit condition, because the cumulative effect of four days of shaking and rattling had finally taken its toll. I was incapable of taking one sure step on *terra firma*, and at night I awoke again and again, frightened by the absence of rattling. . . .

Now I must admit that I always suffer a little stage fright before giving a first lecture—all the more so here, where I was expected to lecture in English. I had less opportunity to speak English during the journey than I had hoped. The Germans who knew English always reverted to the native tongue after a few words, and the true Englishmen didn't speak at all.

. . . I cannot omit a word of thanks for my success to Miss May O'Callaghan, my English teacher in Vienna. Without her tireless efforts at guiding my unwilling tongue, I would have failed. How proud I was now to speak words like "blackboard" and "chalk" with feigned insouciance when I had to requisition these necessaries. How

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The garden of Cloyne Court, the faculty residence just north of the Berkeley campus where Boltzmann lived and boarded in the summer of 1905. The photo dates from that period. Cloyne Court is now a student co-op residence.

STANFORD UNIVERSITY

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The matriarchs of higher education in California at the turn of the century. Jane Lathrop Stanford (left) died at age 76, just a few months before Boltzmann came to California. He describes her as the benevolent despot of the university she and her late husband, Leland Stanford Sr, had built as a memorial to their only son. Phoebe Apperson Hearst (right) headed the University of California's board of regents at the time of Boltzmann's visit. She was a great benefactor of the University: Boltzmann refers to her as *Alma Mater Berkeleyensis*. He describes a memorable weekend at her estate near Livermore. The newspaper publisher William Randolph Hearst was Phoebe's son.

well I pronounced "algebra," "differential calculus," "chemistry," "natural philosophy" and the like. I can also thank my linguistic diligence for an outstanding lobster salad. There it was , written on the menu. I immediately recalled the English lesson where I had found it hard to believe that "lobster" could be the word for this delectable crustacean. [The German word is *hummer.*] But now I called out for "lobster," and it was superb.

The loveliest place one can imagine

The University of Berkeley [*sic*], where I was to teach, is the loveliest place one can imagine. The campus is a park of about a square kilometer, with trees that have seen centuries go by—or is it millennia? The buildings are attractive, with modern furnishings, though they're already much too small. But new buildings are under construction. There is, after all, plenty of room and money.

Something of a philosophical aura hovers over the place. The very name Berkeley is that of a much admired English philosopher who is credited with having invented philosophical idealism—the greatest foolishness ever hatched by a human brain. This is not idealism in the sense in which I have been using the word. Berkeley's philosophy denies the very existence of the material world.[2] . . .

An enterprising local innkeeper, having read in the encyclopedia that Berkeley had been a bishop whose episcopal seat was called Cloyne Court, built a faculty residence and gave it that same name. That's where I lived. But the innkeeper had no interest in creating even the slightest visual resemblance to an English episcopal residence. The building is just off Euclid Avenue, and indeed its precise parallelepiped form had no trace of anything non-Euclidean about it. But the interior was comfortable. I had a small bedroom, a somewhat larger study and a bathroom—all electrically lighted. Warm water can be circulated through thick pipes in the rooms, providing a modicum of heating that was often welcome, even in July. Though Berkeley is at the same latitude as Palermo, it is sometimes visited in summer by frigid winds off the Pacific. On the other hand, Berkeley is only slightly colder in winter that in summer. But that's when it rains. There's no rain at all in summer.

The food was good. Well, at least there was usually something among the day's choices you could manage to get down. There was no printed menu. The day's offering was recited by a bespectacled waitress in a way that made it sound more like a monotone song performed *sotto voce.*

"But life's unmixed blessings are no mortal's portion" [Schiller], not even in Berkeley. . . . Drinking or serving beer, wine or spirits is strictly prohibited in that town. But I didn't want to die of thirst, so I risked drinking the water, but without ice. Perhaps it would be safer in Berkeley than in New York or St. Louis.[3] Unfortunately not! My stomach revolted. One night was so bad that I never took my clothes off. I would have had to put them on again at all too frequent intervals.

A new species of hypocrisy

After that night I risked asking a colleague about buying wine. His reaction reminded me of a scene in the smoking car between Sacramento and Oakland: An Indian gentleman in our company asked quite naively about—let's call them *bajader* houses because he's from India—in San Francisco. . . . There certainly are girls in San Francisco whose motto is "Give me money, I give you honey." But everyone made an embarrassed face.

That very same face was now the reaction to my inquiry about where to buy wine. My colleague looked around anxiously, and then at me to consider whether I could be trusted completely. Finally he divulged the name of an excellent Oakland dealership in California wines. I managed to smuggle a whole battery of wine bottles across the city line, and I soon became quite familiar with the route to Oakland. . . . But I had to drink my postprandial glass of wine surreptitiously, so that I myself almost got to feeling I was indulging a vice. The

temperance movement is thus well on its way to giving the world a new species of hyprocrisy. Surely we have enough already. . . .

. . . My stomach recovered remarkably fast . . . but then a boil developed in my armpit. I had to have it lanced at the Roosevelt Hospital. It was extremely interesting to see this American hospital. Its elegance is not inferior to that of the Kaiser Wilhelm II (I mean, of course, the steamship). But the experience cost me $35. It was the most expensive luxury I permitted myself on the entire trip. . . .

. . . On Sunday, 2 July, I went to hear the weekly "half hour of music" presented free of charge at the Greek Theater. This theater is a faithful copy of the Sophoclean theater in Athens, except that this one seemed to me to be larger. The open-air amphitheater serves very well in a city where it never rains in summer and where fog frequently shades the Sun. But the musical offering was much too thin for this architecturally magnificent space framed all around by eucalyptus and live oak. In this setting Mahler should have been conducting his third symphony with the Vienna Philharmonic, making the trees shiver with delight and the ocean, straining to hear, even more pacific. But these people wouldn't have understood it anyway.

Tuesday, 4 July, was "Independence Day," the greatest American holiday, . . . celebrated every year with fireworks. I watched the magnificent fireworks displays from the roof of Cloyne Court, whose hillside location affords a panoramic view of San Francisco Bay, the Golden Gate and Mount Tamalpais. The old English bishop can hardly have looked out onto anything more beautiful.

The dear Lord himself seemed to be taking pleasure in this celebration, because He started things off at sunset with fireworks of His own, a display worthy of His greatness and His creation. Once again, as so often on this trip, I wished that I could paint.

. . . I decided that I would in future set off a little fireworks display in my garden at home every Fourth of July. The struggle of George Washington and his band has world historical significance. It's not just a matter of local patriotism. Schiller once said, "Another thousand fellows like me, and Germany will become a republic that will make Rome and Sparta look like nunneries." It didn't happen. . . . But ideas don't die. Such a republic . . . does exist, but it's across the ocean. How colossal it is and grows! "Freedom breeds colossi" [said Schiller].

Matriarchy

In the weeks that followed I was invited somewhere every weekend. The first invitation was to the magnificent estate of Mrs. [Phoebe Apperson] Hearst[4] near Livermore. Who is she? That's not easy to explain to a European. One would come closest to the truth by saying Mrs. Hearst *is* the University of Berkeley. In Europe *alma mater* is an idealized figure from antiquity. But in America she's a real woman with—and this is the crux—real millions. Every year Mrs. Hearst gives several million for the expansion of the university. My trip to America was of course paid for by her with her money. The president of the university . . . is merely the executive officer of the trustees, over whom Mrs. Hearst presides. . . .

. . . The situation is even more extreme at Leland Stanford Jr University in Palo Alto, which I visited for one day. After Leland Stanford Sr had become enormously rich [building the first transcontinental rail link], an accident suddenly took his only son, for whom alone the father had amassed his great fortune. He, and especially Mrs. [Jane Lathrop] Stanford, fell into a kind of religious madness. In Europe when an elderly lady goes off her rocker she buys herself a dozen cats or a parrot. Here she hires an architect of the first rank (what *can't* you get with money?) and builds a university that will assuredly be a blessing to future generations.

Unlike Berkeley, Stanford University is laid out in a unified, architecturally attractive scheme that seems to me quite unsuitable for its educational purpose. That's the trouble with architects, in all countries. The university church is particularly imposing, richly decorated with illustrated walls and ceilings, stained glass and sculpture. . . .

. . . After her husband's death, Mrs. Stanford alone *was* the University for a long time. Then she too died [in February 1905], but not without first making ample provision for the university in her will. . . .

It goes without saying that male and female students have equal rights at universities such as these. The same is true of the faculty. I just want to present one drastic example of the far-reaching dominance achieved by the female element. One of my faculty colleagues, Miss Lilian Seraphine Hyde, a not unworthy lady whose name I committed to memory, gave a course of lectures on the preparation of salads and desserts. It was announced in the catalogue just like the course I was giving. I have kept that catalogue as evidence.

Houseguest

. . . The [Hearst] estate near Livermore is a jewel such as luxury, wealth and good taste can create only in a place where Nature herself is a luxuriant spendthrift. Carriages met [Boltzmann and other weekend guests] at the railroad station. They took us through a starkly fantastical but not unattractive entrance gate into a park of fabulous arboreal splendor and floral beauty. Here wealth translates into water. When water is not spared in California, summer and winter blossom forth in equal abundance. For a long time, though too brief for me, we drove through this park, which offered the loveliest views of Mount Diablo and Mount Hamilton.

Finally we arrived at the residence. It is built in Portugese–Mexican style, a ring of buildings surrounding a court sealed off by heavy iron gates. Obviously some sort of fortress. The center of the court is marked by an ancient marble fountain which Mrs. Hearst herself had bought in Verona. . . .

The interior of the hacienda is a treasure chest of the most glorious art works and rarities, which Mrs. Hearst had bought in all corners of the Old World and the New—a most original mix of Greek, Roman, medieval, Mexican, Chinese, Japanese and [east] Indian rarities.

Stanford University in 1903. Two features prominent in this photo—the arch at the eastern entrance to the quadrangle and the steeple atop the Memorial Church behind it—are no longer to be seen. They were badly damaged in the great earthquake of 1906, which left Berkeley essentially unscathed. After a day's visit to Stanford, Boltzmann describes it as "a unified, architecturally attractive scheme that seems to me quite unsuitable for its educational purpose."

As the only European at dinner, I got to sit at Mrs. Hearst's right hand. First came blackberries. "No thank you," I said. Then came the melon, which my hostess salted for me most appetizingly with her own hands. Again I passed. Then came "oat meal," an indescribable paste that one might use in Vienna to fatten geese. But I doubt that Viennese geese would touch it. I had already noted, however, a somewhat displeased glance from *Alma Mater* when I declined the melon. Such a one is proud of her kitchen. So I choked down the oat meal with averted face and thanked God that it stayed down.

That's the dark side of being invited to dinner in an American home. In a restaurant you're allowed to leave what you can't eat. But what do you do with the lady of the house who is proud of American cuisine in general and of her own in particular? Happily the oat meal was followed by poultry, stewed fruit and other things with which I was able to cover up its lingering taste.

After dinner we repaired to the music room, a space about as large as the Bösendorfer Hall. What fantastic baroque decoration! I know of no more beautiful small concert hall in Vienna. Reports of my meager piano playing having reached the hacienda, I was asked to open the concert. After a small show of resistance I sat down at the grand piano, a Steinway of the most expensive sort. Anticipating nothing very special, I struck a chord. Perhaps my ears had already heard a piano of such exquisite tone at a concert, but my fingers had certainly never touched one. If the rigors of my long journey to California had left any lingering regrets, they vanished at that moment. I played a Schubert sonata. At first the response of the keys felt a bit strange. But how quickly one gets used to something really good! . . .

One of the guests that evening was a professor of music in Milwaukee, a man of soldierly demeanor—doubtless a superb bear hunter. . . . He did me an undeserved honor: During a discussion about whether music can be humorous, he asked me, by way of illustration, to play the scherzo from Beethoven's Ninth Symphony on the piano. Should I say, "I can't" to a professor from Milwaukee? Instead I resorted to humor, saying: "Gladly, if you will play the timpani when they come in. It sounds better that way." That silenced him. . . .

Buying immortality

The next weekend was dedicated to the Lick Observatory. Friday afternoon I took the train to the friendly little town of San Jose, with its palm-lined avenues shading streetcars, automobiles and bicycles as well as pedestrians. At seven o'clock the next morning I set out in a somewhat defective mail coach for Mount Hamilton, whose elevation is about the same as the Semmering's. But it looks higher, because at San Jose one is starting out from just above sea level. The road is very good, ascending slowly and smoothly in serpentine curves through vineyards and orchards to woods and meadows where cattle, at that time of year, have only hay to eat. In winter they graze on fresh grass. . . .

We arrived at the observatory on the summit at about 1:30 in the afternoon. Only the younger astronomers were there, led by Dr. [Robert] Tucker. Director [William Wallace] Campbell and the senior staff were already in Spain preparing to observe the [coming] total eclipse of the Sun. . . . They showed me the facilities of the splendidly equipped observatory, which can be exploited to the fullest because of the favorable site.

The most spectacular instrument is the giant telescope with its 36-inch lens, ground by Alvan Clark. The "big glass," as they call it simply, has given us one of the most interesting astronomical discoveries of modern times: the two moons of Mars.[5] Citizen [James] Lick, who had the entire observatory built with his own money, lies buried inside the giant pier on which the telescope rests. Isn't that idealistic? I see through him. Surely he knew that it would make no difference to him where his bones rested. But he wanted to show the world a dramatic example of what the final goal of a millionaire ought to be. Truly, he bought himself immortality.

If I were a poet, I would describe how Schiller meets Lick in Heaven, calling the work *Two Idealists*. Schiller has Wisdom say to Wealth, "I don't need you." Lick proves the opposite. Admittedly, the enthusiasm you can buy for money is second rate, and the love you can buy is not even third rate. But money can also get you a Steinway grand, a violin made by Amati, a Böcklin painting, and now even immortality.

Let me tell another story that relates to idealism and moneymaking. The great American physicist [Henry] Rowland once said in a speech that a scholar should not strive to accumulate money. A year later Rowland becomes sick, undergoes a medical examination and learns that he has at most three more years to live. He has a wife and four children. With commitments thus in conflict, love of family wins out. So he invents a telegraphic typewriter and has it patented. He really does die quite soon thereafter. But the invention brings in a fortune of $200 000 for his widow. . . . Do you know, dear reader, what I admire most about Rowland? It's that he had a profitable invention so readily at hand. May he also

shake Schiller's hand in Heaven.

. . . I was given a tour of all the rooms of the observatory. . . . Every zone of the celestial sphere gets its own cabinet. And in each cabinet every star gets its own drawer, so that all observations can be readily retrieved. The inventory of this business is growing fast. With so much to be done, it's not surprising that the astronomers don't get bored on this lonely mountaintop. Also, it goes without saying that the staff includes attractive female astronomers.

After sunset we saw Mars through the big telescope, large and luminous, looking almost like the Moon. Then we made our way back down to the valley. As we descended, the abrupt ceiling of the fog presented an extraordinary sight. Above us was the starry firmament and below us lay the expanse of fog, spread out like the surface of a sea. With one jolt our coach was submerged in it. From one instant to the next the stars disappeared and our lantern could only penetrate a few yards ahead.

The little laboratory by the sea

. . . No less interesting was my trip the following Sunday to the seaside resorts of Monterey, Pacific Grove and Santa Cruz. . . . [which provided] the opportunity to marvel at sweeping seascapes of rocky coast and playing waves. But far more interesting than all of this for me was a little house in Pacific Grove where Professor [Jacques] Loeb [professor of physiology at Berkeley] had his laboratory.

How striking is the difference between the great works of industry and the modest workshops of science! How imposing are the colossal ocean steamers! But the frequent traveler will have noticed that the officers and crew are always doing the same routine jobs, over and over again. In the passenger salons the same people are always talking about the same things, lounging in the same chairs and playing the same game of shuffleboard. Gargantuan masses, but not one new thought! Admittedly in science too some things have been accomplished by large-scale effort (as we saw at the Lick Observatory). But the truly great scientific advance (our Minister of Education mustn't hear this) is always made with the smallest means.

It must be splendid to command millions of people in great national ventures, to lead a hundred thousand to victory in battle. But it seems to me greater still to discover fundamental truths in a very modest room with very modest means—truths that will still be foundations of human knowledge when the memory of these battles is painstakingly preserved only in the archives of the historian. Of all that was accomplished by the Greeks and Romans, what survives today in its full vitality, richer and mightier than ever? The battle of Marathon has long been surpassed. The last generation that reads Homer or Sophocles for pleasure is dying out. But the Pythagorean theorem and Archimedes' principle are truly immortal.

These are my general views. Only the future can say how they apply to Pacific Grove. The discovery made there already caused me great embarrassment years ago, when it was still quite new. With fiery zeal I set out to discuss it once at a social gathering, never imagining that something so purely scientific . . . could be perceived as obscene. I had no inkling until the lady sitting next to me took her sudden and somewhat dramatic leave. . . .

I must now make a considerable effort to explain Loeb's research without giving offense: It was long believed that the chemical compounds characteristic of living organisms, the so-called organic compounds, can only be created by a special force—the "life force." Today we know that very many organic compounds can be synthesized from their chemical elements by means of ordinary chemical reactions, with no trace of any life force. Nonetheless many people still believe that life itself is something entirely unique, something quite distinct from its accompanying chemical processes, and that the unique processes of life can never be brought about in inanimate materials. Loeb's research has by no means yet disproved this point of view. But it has thrown a new weight into the balance on the opposing side.

It's well known that in some animal species the female egg can, under some circumstances, develop without having been fertilized. This is called parthenogenesis. Loeb, however, worked with species such as starfish and sea urchins, which never exhibit parthenogenesis in nature. Nonetheless, by treating their unfertilized eggs with completely inanimate acids he was able to induce upon them the same effect that is normally produced only by male semen. . . .

This is an important discovery . . . and what social upheavals would follow if this could be done not just with sea urchins but also with . . . human beings! Women would be emancipated to a degree not even dreamt of by the women's rights movement. Men would simply become superfluous, completely replaceable by vials of skillfully mixed chemicals. And then one could control heredity much more rationally than we do it now, with so much depending on chance. Soon they'll find out what mixture yields boys—or girls. And because the former are completely superfluous, they'll just make a few specimens for the zoos. But then, of course, wine will also be superfluous. . .

How very American

My weekdays were devoted to work. But they were certainly not devoid of all entertainment. There were many social gatherings, a few of them quite formal. Before one of these, a colleague who was going to pick me up had warned me, with authentically English fastidiousness, to wear formal evening dress. "Am I not beautiful?" I called out when he arrived that evening. Alas no! I had forgotten to shine my shoes. But my colleague knew what

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Boltzmann lecturing in the Wild West, as imagined by a Viennese cartoonist of his day.

had to be done. He led me to a basement room, took off his coat, vest and cuffs, found the requisite utensils in a closet and proceeded to shine my shoes with virtuosity. And then he drank from the same glass with which he had just been applying droplets of water to the polished shoes. How very American!

Nor was there any shortage of ladies in this social circle.... By the way, the women in California are strikingly tall and strongly built, and some of them have more facial hair than one might wish. I had to agree with a colleague who asked, "Don't you think that women in America have something masculine about them?" But when I countered, "And the men have something feminine," he wouldn't agree. I said that only because they tend to be beardless. Their willpower, courage, enterprise and strength of character deserve no such epithet.

One of the events that broke the weekday routine was the visit of the American Secretary of War[6] who was on his way to the [recently acquired] Philippines. I was told that Miss Roosevelt[7] was traveling with him, but I never got to see her. The Secretary was presented to the entire university community at an assembly in the large live-oak grove on the campus. You should have heard the naive bluntness, daring and enthusiasm of the speeches! All cut from the same cloth. After brief introductory remarks the mayor of Berkeley presented the Secretary to the audience with the words "This is Mr. Taft, a good Secretary of War, a good citizen and in every respect a good old fellow." ...

Yes, America will achieve great things. I believe in these people, even after seeing them at work in a setting where they're not at their best: integrating and differentiating at a theoretical physics seminar....

Finally the evening came when I would hear the monotone song of my bespectacled waitress for the last time. After I had cut my last omelette to pieces, my colleague did a quick count and said, "You have just a half minute left for each piece." Then the train carried me away, by way of Portland[, Yellowstone, Chicago and New York]....

The return ocean crossing was blessed with magnificent weather. And the good food aboard ship rehabilitated my stomach completely. I drank not a drop of water and very little beer, but all the more of a noble Rüdesheimer vintage. The good thing about being at sea is that if you totter a little when you walk, everyone attributes it to the rolling of the ship.

Now only a brief train ride from Bremen to Vienna, a dashing ride in a Viennese *fiaker* [horsedrawn cab] and I'm home. A journey such as this offers much that's interesting and grand. California is beautiful, Mount Shasta is magnificent and Yellowstone is wonderful. But most beautiful, by far, is the moment when you're back home again.

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We thank Walter Kutschera (Argonne National Lab) for recalling this essay to our attention. His translation of the entire essay appears in the December 1991 issue of the Journal of Transport Theory and Statistical Physics. *The German original, first published in 1905, was republished in 1979 by Friedr. Vieweg & Sohn Verlagsgesellschaft, Wiesbaden (Germany), in their Boltzmann anthology* Populäre Schriften, *edited by Engelbert Broda. We thank Vieweg for permission to translate and publish this excerpt.*

Notes

1. Boltzmann's use of the adjective *deutsch* ("German") in the title does not imply rejection of his Austrian homeland. It is an ethnic designation common in German-speaking areas at the turn of the century.
2. Boltzmann's vehemence here may well be an echo of his bitter, ongoing controversy with Mach, Ostwald and the other champions of strict empiricism, who denied the existence of atoms and molecules.
3. Boltzmann participated in a scientific congress in St. Louis in 1904, in conjunction with the World's Fair.
4. Widow of US Senator George Hearst, who made his millions in mining and ranching lands. She was the mother of William Randolph Hearst, the newspaper publisher.
5. Each of these moons is only about 20 km across. They were in fact discovered in 1877 (before the 36-inch telescope was built) by Asaph Hall at the US Naval Observatory.
6. William Howard Taft, elected president in 1908. Willam Randolph Hearst, Phoebe's son, came close to being Taft's Democratic opponent in that election.
7. The beautiful Alice Roosevelt (later Longworth), celebrated daughter of President Theodore Roosevelt. ■