The Alchemical Journey

Part 1



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Figure 1. The internationally famous Tucson Gem and Mineralogical Show has been held every winter since 1955 in Tucson, Arizona. In this figure, the main showcase in the Tucson Convention Center is shown. In addition, several motel units are completely booked as over a thousand vendors from more than 30 countries exhibit their collections. The authors spent several days visiting these vendors, collecting specimens and information about mining sites from around the world. (Courtesy, TGMShowTM [CC BY-SA (https://creativecommons.org/licenses/by-sa/3.0).

This is a continuation of the story begun in "The Beginnings," Spring 2018 issue of THE HEXAGON.

In an earlier issue of *THE HEXAGON*,[1] we told the story of how we planned to travel about Europe and the Americas, hoping to tracking down all the original elemental discovery sites. Our original "literature" research was done in 1999 at the acclaimed International Mineralogical Show in Tucson, (Figure 1) where we conferred with expert mineralogists, geologists, explorers, and university professors from around the world. Wandering around literally hundreds of different vendors (Figure 2), we were using as a guide *Discovery of the Elements* by Mary Elvira Weeks.[2] Weeks had extensively documented in the 1930–40s what was known at that time about the discovery sites of the elements, including the general location of the discovery (both mine and laboratory analysis) of all the elements. We traveled around the symposium, checking off each element as we gained direct information about each.

The last element we had researched at Tucson was uranium, the highest atomic number (92) of the natural elements. The representatives from the Berlin Museum of Natural History (Museum für Naturkunde) (Figure 3) were very helpful, giving us critical information about the mines in Eastern Germany, and they also welcomed us to visit their museum to view the original mineralogical specimens (Figure 4)

So… now we were all set to travel to Europe . . . almost.

Unfortunately, there was one element which we could not check off in our list—tellurium. Nobody at the Tucson Show knew anything about it. This element was discovered in 1782 in an ore from the Transylvania Mountains in Romania (then part of the Hungarian Empire). Weeks mentioned this mine by name, with the location unknown.[2]

Closing our conversation with the Berlin Museum experts, Jenny and I mentioned casually, "We have been wandering around Tucson now for three days, and there is one element we can't find any information about—tellurium. We wonder if you happen to know anything about it."

One of the attendants, Fritz Hess, the chemist of the group, searched his memory. "das Tellur … das Tellur … Ich weiss nicht … Wer hätte gedacht das Tellur würde wäre der schwierigste . . . ?" ("I don't know … Who would have thought that tellurium would be the most difficult…?")

I prompted, "Weeks tells us that tellurium was discovered in the Fascebánya Mine, once in the Kingdom of Hungary, and now part of Romania. But we can't find anybody here who knows anything about historic mines in the Hungarian Empire."

Fritz said, "Tellurium—metalloid used in the semiconductor trade, used in solar panels."



Figure 2. Each motel room is labeled for the geographical specialty. Jenny is in front of the room named for Dr. Jaroslav Hyrsl, renowned mineralogist and author from Prague, Czech Republic. Dr. Hyrsl (pictured inset) was the most important source of information for historic mines and laboratories in Eastern Europe. Inside the room can be seen literally thousands of mineral specimens. Jaroslav was an expert in his field, but he had no idea of the location of the Fascebánya Mine.



Figure 3. The Museum für Naturkunde (Museum of Natural History), located at Berlin, Germany, Invalidenstraße 43 (N52° 31.79 E13° 22.78) is famous for its original specimen of Archaeopteryx, a fossilized 150-million year old specimen of the oldest known bird. The museum also holds countless displays of minerals historically important in the discovery of the elements, not only on exhibit but also in their mineralogical archives.



Figure 5. Belhazy (4 Andreja Kreta, Banská Štiavnica, Slovakia, N48° 27.53 E18° 53.62), the building where the chemical and mineralogical laboratories were located in the famous Schemnitz Mining Academy (also known by the Hungarian name, Selmecbánya), founded in 1770. Famous chemists who were educated here include Josef Müller von Reichenstein (1740–1825) and also and A. M. Del Río (1764–1849), who discovered vanadium in Mexico. Belhazy was visited by the authors in one of their trips to Europe during the period 1999–2008.



Figure 4. In a future trip to Berlin, the authors met with the curator Ralf-Thomas Schmitt of the Museum for Natural History, who here displays the original mineral sample in which Martin Heinrich Klaproth (1743–1817) discovered uranium. Direct contact with experts such as Dr. Schmitt was critical in correcting errors in the literature—in this case, Dr. Schmitt presents torbernite, a green uranium phosphate ($Cu(UO_2)_2(PO_4)_2.xH_2O$, called "Grüner Uranglimmer" in German. In previous literature, it had been erroneously reported that uranium was originally discovered in pitchblende (UO_2), a black mineral originally considered "worthless" by local miners.

"That's the one. It was found somewhere in the Transylvanias in Romania. The mountains are locally called the Apusenis. That's the setting for Bram Stocker's Dracula. The Germans, heavily settling in the region, called it Siebenburgen, for the seven main cities in the region."

"Ach, die Siebenburgen! This may be a difficult one. This was originally settled by a wave of migrating Germans, but then was absorbed into the country of Romania. The country itself declared its independence from the Ottoman Empire in the late 1800s, I believe. The universities or museums of Cluj-Napoca, may be of some help. That's the second biggest city in Romania. It was the capital of historic Transylvania. Somebody there might be able to help you. Who knows?"

"It was discovered by a German, Müller von Reichenstein. There is no known portrait of him.[3] We know he attended the famous mining school in the Hungarian Empire, in what is now Slovakia. (Figure 5) Maybe they still speak German there, and we can get by."

Fritz said, "The Germans departed Romania a long time ago. All the cities in that part of the country used to have German names—Cluj-Napoca was once called Klausenburg. They



Figure 6. The National Mining Hall of Fame and Museum (120 West Ninth Street, Leadville, Colorado, N39° 15.07 W106° 17.64) emphasizes the history and technology of mining.



Figure 7. A special exhibit in the Leadville museum is this collection of memorabilia from the miners in Saxony (Eastern Germany). The axes and canes were ceremonial symbols of the Germany miners during the 12-18th centuries, and are today used in annual Miners' Parades throughout the region.

speak only Romanian now, maybe a little Hungarian… Visiting all the sites of the elemental discoveries? What a challenge! How did you ever get interested in this project?"

"Actually, our curiosity was piqued by a unique display in the Mining Museum of Leadville, Colorado, here in the U.S. We saw it last year, right after we got married. There was a magnificent exhibit on the miners of Freiberg in Germany. It showed how the miners had formed a prestigious guild, with uniforms and historic rites." (Figures 6,7,8)

"Ach, yes, the miners of Freiberg! They are famous! Every year they still have a parade."

"Someday we will see that, I hope," said Jenny.

"I just don't know how you're going to find all of those sites," said Fritz. There are 90 natural elements [technetium and promethium, 43 and 59, are artificial], and each one must have a complex story about it… where it was found, how it was analyzed, subsequent corroborations… Mines, laboratories… And so many different countries!"

Jenny and I looked at each other. Would we dare to wander to a totally different region with strange languages, and just start randomly exploring around?

"That might be scary!" Jenny said, "Maybe we can't get all the elements done, after…"

Or could we?



Figure 8. These paintings show the special dress uniforms of the Saxony Miners. Even in modern Miners' Parades, these elaborate uniforms are still worn.

Planning to visit Romania. Jenny and I were tired. We stumbled back to our motel room, delighted that we had learned so much—but disappointed that we were one element shy of a complete outline for all the elements. We dumped our notes and camera and sat down to rest.

Our minds were twirling—tellurium. … Kingdom of Hungary…Romania…Dracula!…

"Do you think we can do it?" asked Jenny.

"Well, you know what Paul Coelho said…"

"Who's Paul Coelho?"

"A Brazilian author, wrote *The Alchemist*.[4] A metaphorical tale about a shepherd who travels to the Pyramids to find his treasure. A tale about dreams and following your heart. He said to find your treasure in life, you need to go looking for the most difficult thing *first*."

"What? Not the easiest?"

"No…He talks about 'Beginner's Luck.' That all the forces of nature tend to allow you to realize your first task, whatever it may be."

"If only we can find a contact… We will see things maybe nobody has seen…and I want to photograph this whole new world!"

"I wonder if there are maps of the region? We now have GPS—this brand new technology



Figure 9. Jim and Jenny ready for travel, with no suitcases, but only backpacks. Jenny has the brand new Sony Mavica digital camera slung over her shoulder.

now available to the public. We can record the latitudes and longitudes . . . and make the maps if we have to!"

That night we drifted into dreams… Dining in the home of Dracula… and exploring the mountains for this element tellurium, stumbling over rocks and sloshing through wetlands…

Return home to UNT. How to make a contact? Fate sometimes expresses itself in amazing fashion. Being a flight instructor, I belonged to a group of aviators who lunched frequently in the UNT University Union. Topics of conversation could include not only common flying interests, but also recent family happenings, recent travels, research findings in our own laboratories or elsewhere. I reported on our recent trip to Tucson, "Somewhere deep in the heart of Dracula land is a mine in the Transylvania mountains. And we don't have the faintest idea where it is." One of the fellow pilots was Dr. Don Smith, a professor in biology whose recent research interests were in plant biology. He responded, "My wife Neila has a friend at TWU (Texas Woman's University, across town) who is from Romania. I'll ask her."

That night I got a call from Don. "Our friend at TWU has a cousin at Cluj-Napoca, originally from the university there. Does that help?"

"Absolutely! Can you contact her?"

"I'll have to ask her. She'll either write or send a FAX. I don't think they have Internet yet." At the following lunch Don had an answer. He handed me a slip of paper. "Here's a name. Dr. Dana Pop. She is head of the Mineralogical Museum at the Babeş-Bolyai University in Cluj-Napoca. They are friends. Here is Dana's FAX number. I think she is expecting a message from you."

"What's that little mark below the 's'? Is that a cedilla? Like in French?"

"Yes, my informant at TWU pronounces it 'Babesh.' Romanian is a funny language, a Romance language, possibly the closest to classical Latin grammatically. The university is the largest in Romania. It's named after a bacteriologist and a mathematician. Babeş helped defined bacteria's role in diseases. Bolyai was the first to introduce non-Euclidean geometry. He found new ways to view the universe, way back in the early 1800s. Laid a foundation for Einstein's mathematics, apparently."

We faxed Dana that afternoon. We described our quest. "All we know was that there was this historic mine called "Fascebánya" in the Kingdom of Hungary—now a part of Romania. This historic area was first explored by Western Europe geologists in 1802 by Edward Daniel Clarke (1769–1822), Professor of Mineralogy at the University of Cambridge, England. Clarke was an ambitious explorer, visiting countries ranging from Russia to Africa to Sweden. In an 11-volume series,[5] he meticulously set down his experiences as he observed chemical factories, mines, and laboratories, as well as the countryside and the culture of the peoples. But he never personally saw the Fascebánya Mine. Instead, specimens were brought down to the home laboratory of Franz Josef Müller von Reichenstein, a geologist in the German outpost of Hermannstadt, now known as Sibiu, Romania. Reichenstein discovered the element in his own home laboratory."

Dr. Pop responded in a few days. She had a located an archival record of Fascebánya above a mining camp in Zlatna, a gold-mining town in a valley in the Transylvanias. A consortium had moved to this site recently, in an attempt to revitalize the gold mining industry there. The head of the group, an Australian named Virgil Berberich, reported that some of his Romanian miners might be able to locate the mine from archival maps.

We looked up Zlatna in our Romanian guidebook (this was years before Google Earth or Maps). There was nothing in Zlatna. We called up our travel agency to see if there were any accommodations there. They had never heard of it— no hotels, no tourist attractions. It was new territory to visit.

After a few more fax exchanges, and we had a date set. Early the summer of 1999. There was actually a total eclipse of the sun passing through Romania later that summer, in August. "Do you want to stay for that?" asked Dana. But we couldn't, we had to return to the university before then.

The trip to Europe. We knew we would be hiking a lot, so we didn't take suitcases, just backpacks. (Figure 9) For a week before we left, Jenny unpacked and packed several times, just to make sure she knew where everything was—everything from strong twine (to hang washed clothes) to extra socks. In my pack I had another unique variety of items, including magnets and a portable Geiger counter to test mineral samples. We allowed only two changes of clothes per person. To decide which particular pants and shirts to take, Jenny washed a clothes line full of clothes and hung them up one a string stretched across the room. The first ones to dry were the ones to go into the pack and taken to Europe. These clothes would be ready to go the next morning after a washing of clothes in some European sink the previous night.

Indispensable for our trip to Europe were the Garmin GPS-92 to map the unknown trail to the alleged Fascebánya; Jenny's digital camera, a Sony Mavica which used 3½-inch floppy disks for storage but at the time was state-of-the-art; and many notebooks (see "The Beginnings"[1]). This was years before tablet computers were on the market—often I would complain to Jenny during the early 1990's, "If only there was a computer we could quickly make notes on!" And also critically important for the trip was a dual Eurail Pass, which would allow us to pass easily through Europe rail travel. Romania and Hungary had just been added to the Eurail plan, so that was an additional Godsend.

We flew to Germany that summer. Off the plane in München (Munich), through customs, and then a brisk walk to the train platform—then a slick train took us to the Hauptbahnhof (main train station downtown).

Our schedule would take us by train from München to Wien (Vienna), then on to Budapest, and finally cross the Hungary-Romania border, on to Cluj-Napoca, Romania. Jenny was amazed at the smoothness of the journey, it was like gliding on ice. We had jet-lag, but we were happy and felt secure… . All was well…

I had had extensive training in conversational German during my university days, so as we were gliding silently on the technically advanced rail system of Europe, I could understand the conversations around me. I was relaxed and Jenny, sensing my ease, could sink



Figure 10. Rolling hills of Austria, at the foothills of the Carpathians.

into her prize she had bought at the English section of the Bahnhof bookstore—"I found a copy of *The Alchemist*!" she had happily exclaimed as we were boarding the train in Munich. Out the window, the lower Carpathians, a spill-over of the Eastern Alps, melted down into rolling hills outside Austria—no more white-topped mountains, just green mountains, smoothed down to make a undulating horizon. (Figure 10)

We changed trains in Vienna, and things changed. As the train from Vienna crossed the Hungarian border, the signs and names of cities suddenly became unfamiliar—the familiar Germanic names of Vienna and Salzburg (of Strauss and Mozart fame) were behind us. Now the strange names of Györ, Hegyeshalom, Mosonmagyaróvár appeared on the stations we passed by. The landscape changed, as the Carpathian Mountains of Austria transitioned to the plains of Hungary. (Figure 11). This is where the Magyars, a nomadic group from Asia, settled centuries ago. They brought their culture and their language with them, as well as their indispensable horses, which were meant by Nature to be ranging on open ranges.

A sharp wave of panic swept through me as I realized that I did not know how to pronounce the names—I couldn't speak this language. I asked the conductor, a prim lady in a white jacket and red cap, who understood enough English to understand my question. She slowly sounded the names—"Dyur," "Heg-yesh-hal-om," "Mush-om-mag-yur-o-vah." Conversations around me were strange and disorienting. I lost that sense of "belongingness," as described by Oliver Sacks, in his autobiography "On the Move," where one loses a self of self-content and security when things become unfamiliar, when one moves into unfamiliar territory.

"Beautiful scenery, but the new language is a little frightening," I said to Jenny. "I have no idea what they're saying. This is a bit scary—How can we explore unknown territory when we don't understand anything?"



Figure 11. The Hungarian landscape transitions into plains of Hungary, perfect for the immigrating horsemen of the Magyars. This field now is cultivated for wheat.



Figure 12. Scenes from the train window frequently included expansive fields of beautiful sunflowers, reminiscent of Kansas.

Jenny was now absorbed in the beautiful scenery going by, now huge fields of sunflowers extending for kilometers, like a van Gogh painting. (Figure 12). She laughed, "I haven't understood a single word since we landed in Germany!" She turned to me and said, "But it'll be all right." She tapped her book, "I just read in *The Alchemist* that 'When you want something bad enough, all the universe conspires in helping you to achieve it.'"

"One cannot discover new continents unless one loses sight of the shore."—On the tombstone today of Jenny Marshall, who passed away in 2014.[6]

Next: Arrival in Romania.

References

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