

UNIVERSITY OF PENNSYLVANIA

GUIDE TO THE ALPS

2022



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FOREWORD

This book contains the accounts of each student taking part in the 2022 Penn in the Alps program. This program is a 12-day geology course that uses the exploration of both natural and built environments to instill students with knowledge of the region.



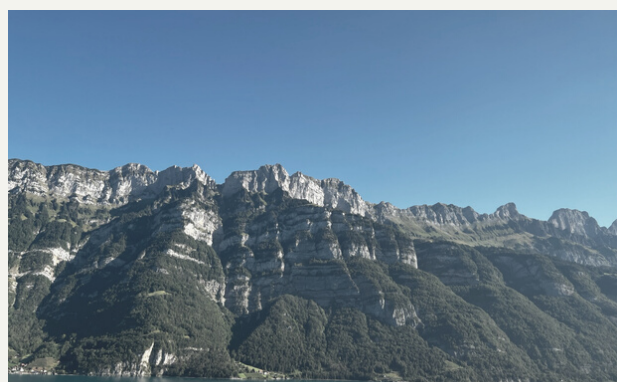
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TOPICS STUDIED

Course: EESC 3003 (1 c.u.)

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| 15. | Charlemagne and his influence in the Alpine region; from Roman city to world financial center |
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| 16. | Rhine canyon and Flims landslide; gorges and Roman roads; language divides; Sistine of the Alps |
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| 17. | The Alps and their impacts on the Roman, Medieval and modern history of Europe |
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| 18. | Strategic position and history of a key town |
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| 19. | Bergell culture, people and architecture; continental divide; language divide |
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| 20. | Permafrost; climate change and its effects on mountain villages; farming in extreme environments |
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| 21. | Traditional architecture; Ice Age; glacial retreat and effects on ecosystems, landscape and culture |
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| 22. | Glaciology; glacial geomorphology; history of emigration |
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| 23. | Importance of stone quarries for the population of the Alps |
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| 24. | Genesis of igneous rocks and effects on surrounding mountains; The Earth's mantle at today's surface; flora and fauna of the Alps |
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| 25. | Where Africa meets Europe (and the World) |
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| 26. | Unesco World Heritage castles; Alpine landscapes; historic trade routes |
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AUGUST 15

MAATHANGI NELLICHERY

On a sunny, hot (pay 6 CHF for a bottle of water kind-of-hot) day, 14 students gathered around outside the doors of the Hotel St. Josef. We went around, sharing our names, with all the awkwardness of first introductions. Little did we know that 12 days from then we'd be standing in the same spot hugging goodbye to life-long friends after encouraging each other on tough trails, forming endless inside jokes, and dancing in the rain on the streets of Zurich.

As a group, we walked to the Swiss Federal Institute of Technology (ETH) where Reto told us about the school which overlooks the city. He explained that it was world-renowned for life science and engineering, most of the courses are taught in English, and it is a beautiful place where we should attend graduate school. He also told us there was another university just next door, the University of Zurich. Next, Reto told us various things to know to make sure we survive in Zurich like how it is a big pedestrian city. There are many roads blocked off and pedestrians have the right of way, but street cars have the right of way and do not stop, so make sure to stay out of their way. We stopped to take photos of the city.

Next, we began a tour of the city. Reto pointed out how there are little houses on both sides of the Limmat river (one being his mom's house!). Reto showed us a Roman Tombstone from 200 CE and then took us to Lindenhof, which means the court of Linden trees. This was a settlement during the Bronze Age in 1500 BCE and then in 15 BCE when the Romans conquered most of Europe and the Alps. Reto explained how the Romans developed many roads, ones that we would soon be hiking (and falling) on. Romans established a military camp here so they could control trade on the river. Reto began to expand on the history of Switzerland. After the Romans, the Alemannic tribes arrived and waged war to establish their own rule. In 400 CE, local kings established their own kingdoms, and then Charlemagne and the Holy Roman Empire took over. In 1219, cities started uprising against the Holy Roman Empire and were granted independence. August 1, 1291 is Switzerland's Independence Day, and this is when Switzerland was founded. 1517 is when Zwingli created his own Protestant reformation which was separate from Lutheranism, but also one that did not believe in gifts to the Church in order to get out of purgatory. Eventually, people got tired of nobility and there were large revolutions where guilds started to run towns in the Middle Ages. Some of these guild buildings are beautiful restaurants today. In 1798, Napoleon conquered large parts of Switzerland. In 1848, Modern Switzerland formed and Alfred Escher, a banker and engineer, helped fund lots of political institutions, universities, and railway systems and contoured majorly to Switzerland's development.

After Reto's talk, Nikki got thirsty and Reto said she could actually drink from the fountain. I dared her to drink straight from it and we all laughed thinking it was crazy. But soon, this would become commonplace as we got used to the fact that there were drinking fountains all over the city and were usually dying of thirst (sometimes enough to drink from ones that possibly had too much arsenic in them...). Then, we all took pictures from the beautiful view up on the hill.

After this brief history of Switzerland, we began to walk down toward a Church. Reto pointed out the St. Peter's Church clock tower. He said that it was the largest clock in Europe, bigger than the Big Ben, to which someone piped up, "looks kinda small" and we went down a Googling rabbit hole of largest clock towers.

At St. Peter's Church, Reto told us more about the beautiful church. There was already a Church there and it was rebuilt after the Protestant Reformation. What makes this church very different is that it lacks much of the ornamentation seen in Italian churches. This is likely because the shift to Protestantism was characterized by the rejection of ostentatious displays as was often done by the Catholic Church. The church still holds services today.

Next, we went to the Fraumünster Church which means Church of the Ladies. The top part of the church is gothic while the rest is romanesque. Reto explained that Zurich was way ahead of its time, and during the 14th century the area was actually ruled by women. The head of the monastery founded the Fraumünster Church. The notable characteristic of this Church is the stained glass windows, which are done by the famous Marc Chagall. The church, and most churches we would soon see, had a crypt which we explored (but only for a bit because it smelled kind of funky).

Next Reto told us the legend of two martyrs who were decapitated and then picked up their heads and carried them up the hill. These are the patron saints of the city. Charlemagne, after hearing this tale, built the Grossmünster Abbey on this hill. The crypt in this Church has a huge statue of Charlemagne that apparently used to be featured outside but was moved inside for preservation. Reto also told us that many universities start at seminaries, and this church is where the University of Zurich began. This Church also featured stained glass windows, but we didn't like these as much. Apparently, they were done by modern artists that won a competition in the 2000s. I'll feature a picture below and let you make your own conclusions...

Then we started walking to Lake Zurich and, while there, we saw many Swiss flags on the water. Reto asked us what makes the Swiss flag unique, and after we struggled for a few minutes, Chase finally said "It's square, I know because of the emoji!" Then, we went to Co-op, a grocery store, to buy lunch for the next few days and on the way, Chase and I had a very serious debate on whether it was coop or co-op (I lost, it is in fact Co-op). Most people here got various forms of bread, cheese, nuts, and dried fruit. Almost everyone also got grapes. Almost everyone also hated these grapes when we all tried them the next day and found

out they had seeds in them. This is also where I want to shout out Thomas because we were the only people that finished our shopping early so, I said hi and he walked away from me. This was the start of a long feud between us.

After dropping our stuff off at the hotel, we all went to dinner. When Reto asked about wine, Mackenzie, 22, asked "We're allowed to drink?" which made us all giggle, especially when Reto said, "of course". And then we drank. A lot (which would set the theme for the rest of the trip). Notable events were Thomas pouring his wine glass to the brim, and our table stealing a bottle of wine from the other table. Nikki and I also had the best chocolate cake of our lives.

Then we walked back to the hotel and got ready for the next day's adventures. I've decided to include a hand-drawn map of some of the key places we visited to demonstrate how we explored all around Old Town and how Lake Zurich lies centrally because the city is built around this important lake.



Fig 1. View from ETH, Overlooking Old Town.



Fig 2. Roman grave stone of Lucius Aelius Urbicus.



Fig 4. View from Lindenhof.



Fig 3. Nikki Drinking from the Fountain and Daniel Leisurely Sipping from his own Bottle.



Fig 5. The Clock Tower of the Fraumünster.

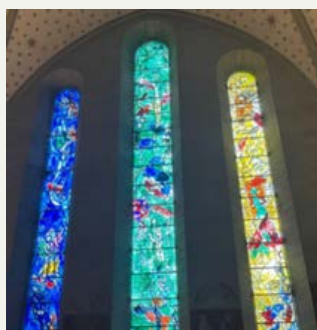


Fig 6. Chagall's Windows.



Fig 8. Charlemagne Statue in Grossmünster.



Fig 7. Sigmar Polke's Stained Glass Windows in Grossmünster.



Fig 9. Lake Zurich.



Fig 10. First Night's Dinner.

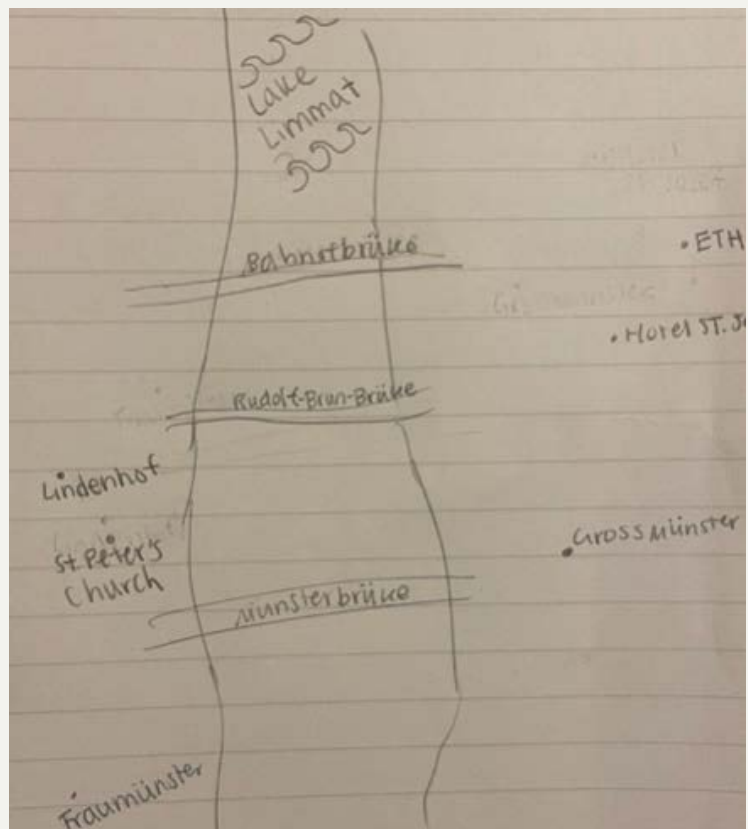


Fig 11. Map of Old Town and Places we Visited.

AUGUST 16

NIKKI CILENTI

I volunteered to journal on Day 2, and quickly realized I had a huge undertaking. Day 2 felt like the first real day of the trip as we all woke up together in Zurich. We were with each other 24/7 from every moment after that. After waking up, we all packed up and made our way to the breakfast room. We had our first taste of European breakfast and we all feasted on some variety of bread and jam or meat and cheese. It was a traditional breakfast spread we grew incredibly accustomed to.

After breakfast we had to load up the vans and head out on our first adventure. Everyone shuffled into cars as we tried to fit everyone's suitcases. Little did we know these cars stayed the same every day for the rest of the trip. I was in Reto's van and excited about the group I had found myself in. We were off, only to return to Zurich the very final day of the trip. We stopped at a rest stop after a few hours and we all sat and enjoyed a coffee or food. We were traveling all the way to Italy and making many stops on the way.

Our first destination was called Ruinalta. We stopped along the windy roads and climbed up to a look out point. We stared down at the beautiful meandering river from above. We learned that meandering rivers usually occur when the ground is flat. The inner portions of the curving river are typically walls or a natural barrier and the outer curves lead to erosion and rocky areas (Figure 1). The water was fairly dried up due to periods of drought in Switzerland this summer, causing problems for electricity generation. The lack of water in the rivers means there is less water power available to create hydropower-based electricity, a major source of Switzerland's electricity production. Reto then discussed a landslide that had occurred in the region, causing rocks to tumble down into the river. These rocks created lakes and dams. Eventually the dam broke and the lake flooded, bringing boulders down to the bottom. It was a catastrophic event that occurred around 10,000 years ago which we learned through carbon dating.

We discussed a little more about the culture and geography of the region, learning Romansh was spoken above the landslide and German was spoken below. Additionally, there was a region near the top in which there was a relatively flat area. This was formed due to the overlapping of tectonic plates. Additionally, we learned that the forests protect from avalanches, as well as long metal structures that had been built. In order to protect the land, after 1860 a new tree needed to be planted after a tree was felled. After a lesson from above we got back in the vans, drove a little bit more and made it to our first hike.

The "mini" hike they had discussed ended up being far more challenging than expected. Unlike most hikes we did on this trip or most hikes I had participated in prior, we began the hike by going down.

The path was extremely steep and we were all struggling to walk down carefully. Many of us had more confidence in our hiking abilities than we should have and quickly realized this was going to be a challenging week. On the hike down, we passed a few water spickets, and learned that unless a sign says "do not drink" most fountains were cold and clean drinking water sources. Eventually, we got to the bottom and the view was incredible. There was a bright light blue river, the Rhine, winding through the rocks. It was my first wow moment of the trip and we all sat and soaked in the view. We all pulled out our lunches and began assembling sandwiches with what we could find from the coop the day before. Daniel managed to slice his finger open on Saige's Swiss Army knife and we all laughed while Steffi and Reto bandaged him up.

We took lots of pictures before we began the hike back up. I was quickly humbled as the entire vertical 1.5 mile hike back up the mountain commenced. The first hike of the trip was complete and we were all nervous about the coming hikes if this one was just a "mini" hike. We filled our waters up, applied more sunscreen and climbed back in the vans.

We drove for an hour or so to a small town called Zillis where we listened to Daniel's presentation and explored the very famous church coined as the Sistine of the Alps. The Church is known as the church of St. Martin in Zillis, and is a very famous landmark for Alpine travelers. The town dates back to the first century and has acted as a safe haven for travelers. Zillis was built with the intention of being a refuge for travelers. Three different grueling Alpine passes all lead to Zillis. At the beginning of time, it is likely the church acted as a hostel of sorts. Travelers could find refuge and sleep in the church. Beginning in the 12th century, people got baptized at the church.

The church appears to be very simple from the outside, but the beauty is where the inside of the church lies. The ceiling of the inside is incredibly elaborate and decorated with paintings. These paintings are the reason that the church is known as the Sistine of the Alps. More specifically, there are 153 paintings on the ceiling. Every ceiling tile has a different scene painted on it. The exact number of rows and columns is a religious number, further emphasizing how detailed every portion of the church was. The tiles 1-48 depict an ocean scene and the central tiles describe the life of Christ and St. Martin. The last row is the patron saint's life, and interestingly was painted by a different artist than the rest of the tiles.

The church itself was designed in the romanesque era, which is reflected in the architecture of the church. The church is simply constructed with a low ceiling, stone ricks and rounded windows. Churches were more practically constructed in this era because, as Daniel said, "people bought their tickets to Christianity but were not yet on the train". The church itself was built from the flesh of the Alps. Local metamorphic rock and spruce made up the ceiling. The glue was made from bones and tissues. The ceiling tiles also reflected the Alpine landscape with a river, church, and scene of travel. The patron saint of the church, St. Martin, was

famous for sharing a cloak with a beggar. He is believed to protect people during travel, and people pray to him for protection while traversing the Alps. He is known as the patron saint of travel.

Following Daniel's presentation, we saw our first cows up close and personal and then went to explore the museum. After exploring we were able to enter the church. We were given little hand mirrors to study the ceiling and it was truly a beautiful site. Many of us laid down on the benches to soak in the ceiling fully.

We climbed back in the vans to drive to our final destination before reaching Italy. We drove to another enormous gorge, known as the Via Mala. We stopped in the gift shop and then climbed down all of the stairs into the gorge. Reto taught us about the different rock types that made up the wall and pointed out different features of the enormous gorge. We walked around as water leaked and the rushing water flooded through. We learned that the Via Mala was a very treacherous pass that the Romans used to take. It is so deadly because the path seems very safe from above, but one slip and you would fall thousands of meters straight down to your death. It is known as one of the most challenging paths and is very famous currently. After spending some time looking at the different rock structures and listening to Reto we climbed the stairs back up to the gift shop. We all thought it would be fun to buy Swiss army knives, despite Daniel's slip up earlier in the day. We also bought Reto's favorite chocolate, Ovomaltine, that we all learned to love by the end of the trip.

Back in the vans, we were on our final leg of today's trip. We were finally going to Italy. We drove up and over treacherous mountain roads with what felt like a million switchbacks. We got to the top of the mountains and crossed the famous Splügen pass. Much to our surprise the border was a little road that you could freely drive across without any regulation. We approached the town of Montespluga, Italy and I immediately fell in love. The town was incredibly beautiful, although town is a generous word. There were about 10 buildings that made up the entire village. We parked and walked to the hotel where we witnessed the most wholesome interaction between Reto and his longtime friend Roberto, the owner of the bed and breakfast. We split into rooms, with May and I getting one of the cutest little double rooms. We took pictures and roamed the town for a bit before dinner.

We all came back and sat around two long dinner tables and had one of the most incredible meals. There were two courses, a pasta dish and a meat/vegetarian dish along with carafes of red wine on the tables. We started with a very traditional dish known as Pizzoccheri, a pasta made with buckwheat, and also blueberry gnocchi. The dishes are made with all local ingredients and are incredibly fresh. We then had a sausage and polenta dish. At one point, Reto got up with his empty carafe of wine and told his friend "I think we have a problem here" and laughing, Roberto went and filled it with more wine and put it back on the table.

I grew to love these meals, spending hours around the dinner table after a long day was so much fun and we all got to reflect and learn about each other as the trip went on. We went to bed that night stuffed, exhausted and excited for what was to come.



Fig 1. View of the Rhine gorge and river down below.

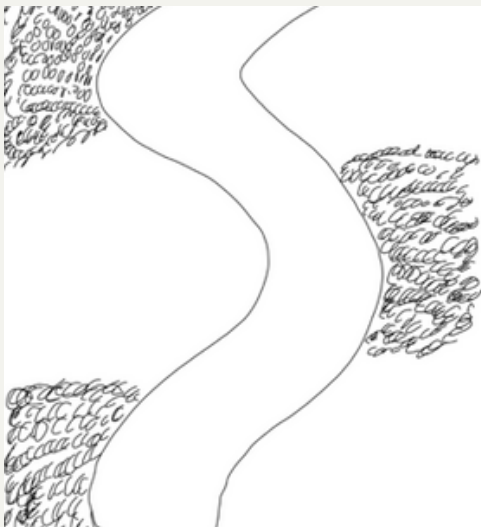


Fig 2. Sketch of the erosion patterns.



Fig 3. Daniel sliced his finger open.



Fig 4. My sandwich after hiking down to the river.



Fig 6. The gorge at Via Mala.



Fig 5. The Sistine of the Alps church ceiling tiles.

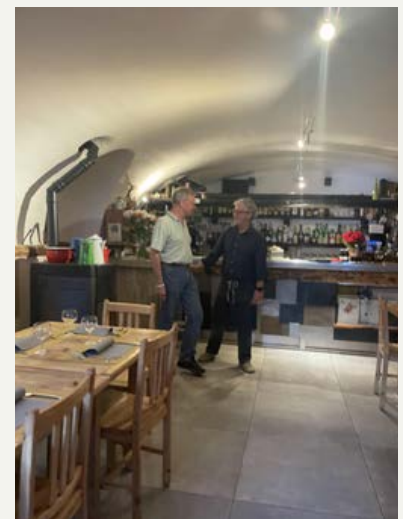


Fig 7. Roberto and Reto in the dinner room.

AUGUST 17

MCKENZIE HOOPER

This morning was the first morning we had woken up in Italy and not Switzerland. Now granted, the town we were staying in — Montespluga — was about as close to the Swiss-Italian border as one could get, but it was still a different country, nonetheless. The hotel we stayed at — Albergo Vittoria — consisted of the rooms: May and Nikki (double); Maggie, Christina, Shalese, and Maddie (quad); Dina, McKenzie, Saige, and Steffi (quad); Luke, Daniel, Jacob, and Thomas (quad); and Reto and Chase (double). When we awoke that morning, we had breakfast at the hotel, which consisted of a very carb-heavy breakfast including croissants, bread, packaged bread and crackers, yogurt, and jam as the options.

After finishing breakfast, since we were only staying in Montespluga for a single night, we had to pack our suitcases and luggage in the vans once again before we set off. When we departed Montespluga, we had to drive around Lago di Montespluga, the large lake right outside town. Lago di Montespluga, we learned, is an artificial lake, not natural, and used for hydropower generation, which explained the large dam at one end of it. We also deduced that it was built in 1931, as indicated by the Roman numerals engraved on it (MCMXXXI). 1931 was during the time that a lot of dams were built (usually by Mussolini), and Lago di Montespluga happened to be one of those. Sadly, the lake had an extremely low water level, much lower than it had been in previous years according to Reto and Steffi — just another unfortunate consequence of global warming in addition to so many others.

Then, keeping our vans parked by Lago di Montespluga, we set off on our hike for that day. Unfortunately, the weather was not the best that day — a heavy fog in the air as well as the beginning of a light drizzle. Normally, weather conditions like this are never an issue when living in a city or even town, but when hiking, especially the hike we were about to do, the conditions were not in our favor at least in the beginning. Aside from early morning dew and condensation, the rocks marking the trail and making up part of the pathway were even more slippery due to the light drizzle, and what was surely a stunning view was, at that moment, obscured from our view because of the fog. But alas, we were determined and excited for the hike and persisted onwards.

The hike that had been planned for us that day was Valle Cardinello. Valle Cardinello was a ravine that was used originally by the Romans as both a trade route for merchants as well as a path through the Alps for armies and troops. Then, out of curiosity, Christina looked up what ancient Roman army footwear looked like to see what the ancient Romans would have worn to traverse the same terrain that we were already kinda struggling with in our much more advanced hiking boots (spoiler: they were basically just sandals).

When the Romans hiked this path, it was just them, no chariots or anything else since the path was much too narrow for those to pass through safely — although one could argue it was also too narrow for massive numbers of troops as well...

And as traversing the Alps was a treacherous feat for many centuries following as well, this ravine continued to be of use long after the fall of the Roman Empire. For example, another prominent user of this ravine was Napoleon when he sent one of his armies across this ravine. Unfortunately for him, he made the mistake of ordering their hike in November, and if there is still snow in the Alps in August in 2022, then you can only imagine the amount of snow in November back in the 1800s. So, to nobody's surprise, Napoleon lost a lot of men that winter in this ravine. As we expected, the path was slippery right off the bat because of the light rain and early morning conditions. We had to walk a little way to actually get to the ravine, and even then, some of us slipped on the wet grass — already a great sign before we even set foot in the ravine.

This was our second hike of the trip (the first being the one down into the Rhine River Gorge), and it was COMPLETELY different from the first one. First of all, while the trail down to the Rhine River Gorge was mostly under the shade of trees, this one was mostly completely open. This openness allowed us to see the landscape, including the massive (and very intimidating) drop down off the path to the bottom of the ravine. Safe to say, even if the path was relatively safe, some of us were much more wary and cautious than we initially were after seeing the steep drop off that could end VERY badly if we were not careful. Luckily, there were no serious accidents during the hike, but I cannot say that there was no falling in general. I got my butt a bit muddy after my foot slid down a rock, and Nikki also slid off a rock while we were all standing and waiting for the group to meet up again. Nikki's fall could've been much, MUCH worse had she slipped the opposite direction off the rock — straight off the pathway and down the steep drop off. Luckily, she didn't, so we were all spared what could've been a serious accident. Thomas unfortunately fell many times during this hike, but none of them were serious, so it was all good. Sadly, the same thing could not be said for the white shorts he was wearing that day...

During the hike, we talked a lot about the vegetation dotting the path. Today was the day many of us learned about a larch for the first time. A larch is a conifer with very light green needles that were soft (soft enough to make a mattress out of even). Luke is now sold on larch needle mattresses and is determined to get one, even if he had to import it. The larch loses these soft, light green needles in November and remains needle-less for the rest of the winter, an oddity for conifers and one of the only ones to do this.

Along with the larch, other plants we discovered on the trail included some rhododendron bushes, which I was actually very pleasant and happy to see. You see, back home in my yard, I actually have very big and beautiful rhododendron bushes, and while I was not homesick, it was very nice to see something that reminded me of home so far away in the Alps in Italy.

As we continued, we also were able to find a few raspberry and blueberry bushes, and some of us actually got to eat some of them (not me though because I was good, thank you)! In fact, there was this one point when we were all standing around this bridge, and we were looking for Steffi because she was nowhere to be seen even though everybody was already there, and I remember spotting her on the same side of the stream as us much further down the stream. We asked her why she was all the way down there, and her answer was that she had gone a little off trail to find more raspberries along the river. She was successful and offered us some more berries.

Actually, that bridge we were at was in the middle of a cow pasture. I should've expected it, knowing how the Alpine region was famous for using the mountain sides as cow pastures, but I was still caught surprised when we had started walking through a cow pasture area during the hike. Now, I am not the biggest outdoorsy person, but I can handle most things, but the massive amounts of cow poop? YUCK. It was not my favorite part of the hike let me tell you. And somehow, when we stopped for the presentation that day, we stopped at that bridge, which had a TON of cow poop all around it, so clean seating was limited, and the smell was not very floral let's just say. The presentation that day was May's, and her topic was quite appropriate for the setting she was given to present in — history and adaptation of human settlement and agriculture in the Alps. She discussed humanity in the Alps back in prehistoric times to when they first started to be settled and their land used, appropriately mentioning cows as the main livestock and major backbone for the Alpine region. From Reto, we learned that most cows in Switzerland were dairy cows, including the ones whose pasture we were currently residing in.

Soon after, we encountered some small houses. These houses were lived in, but only for certain times of the year, the warmer seasons. During the warmer seasons, the cows are moved higher up the mountains, so it only makes sense that their keepers and caretakers would follow them up the mountains. However, it would be too much of a hassle for them to commute up and down the mountains every day, so they lived in these houses during the times the cows lived at higher elevations, and in the winter, when the cows had to come down to lower elevations, they left these houses and lived in the valleys.

At some point in the hike, Reto and Steffi left us to finish the hike faster than us. You see, in the past, when they had hiked this trail, they reached the village and turned back, going back up the same way we came. However, this time, Reto and Steffi wanted to try something different. They didn't know that we could go down even further the ravine down to the lake, which is further than past years had gone. So, instead of stopping earlier and then going back up, they decided to hike all the way down to the end, catch the bus back to Montespluga, get the vans we had left parked at Lago di Montespluga, and pick us up at the end of the trail.

However, because they had to catch the bus, they needed to get to the town faster than the pace we were moving, so we were on our own for a while. Luckily, Daniel was a fantastic leader and kept us all together. When we reached the town at the end of the trail, we stopped at a café where we had some refreshments and bathroom breaks — coffees for some, croissants for others, and perhaps beers for another. Then, we continued on down to the lake to have the lunch we packed while we waited for Reto and Steffi to arrive with the vans, which they eventually did and joined us for lunch.

After finally wrapping up the hike for that day, we all hopped back into the vans and were off to our next destination. However, on the way, we had a pitstop because every opportunity is a learning opportunity. We stopped at Commune di San Giacomo, a small town on our way to the next city. The reason why we stopped here? To study rockslides. You see, another adverse side effect of climate change is that rockslides are becoming much more frequent and dangerous. Some rocks high up enough are 'glued' to the mountain with ice (permafrost), but as the temperature rises, this 'glue' is melting, causing the rocks to become unstable and sometimes fall down the mountain in a rockslide. This poses hazards to people living in towns and villages in the valleys of these mountains, right in the path of these rockslides. Comune di San Giacomo happens to be one of those towns. Except at the same time, it isn't.

Despite being at the foot of a very rocky mountain side, Comune di San Giacomo is 'safe' (according to Reto). But what are the signs that made him deem it relatively 'safe'? Mainly, the many trees and other vegetation (like lichen) that stood between the town and the rocks higher up. As ice retreats, lichen will come in and colonize the area the ice once covered. Vegetation, like ice, helps stabilize the slopes and keep stuff from moving. However, it takes a long time for vegetation to start growing in these areas. So, the fact that there were many trees and other plants growing on the slopes between the town and the rocky higher ups shows that big rockslides had happened long ago, but enough time had passed between then and now to allow this vegetation to grow. Higher up the mountain though, the vegetation faded only to rocky sides at higher elevations. Because of the lack of vegetation here, it shows that the rockslides that occur here are younger and more recent, and with the lack of vegetation, these parts of the mountain will still let rocks tumble and slide, but overall, the town and area were safe from giant rockslides. Aside from helping stabilize the cliffs, the trees and previously fallen/left boulders acted as a barrier to stop any additional big rocks from destroying the town's buildings.

A unique feature of Comune di San Giacomo was that many building were built right next to or even into some large boulders and rocks, which came from glacier retreat as well as ancient rockslides. And rather than being deterred, people took advantage of these natural features and incorporated them into their architecture. Cavities in these large rocks act as natural refrigerators. While they may not be airtight, they are cool and stay cool all year long without the need for any

electricity. Thus, the townsfolk use them as cellars, pantries, refrigerators, etc. as they are built right into their homes. After learning about rockslides and the town, we got back into the vans to finally arrive at our final destination that day: Chiavenna. Italy.

Arriving in Chiavenna, we got settled at our hotel San Lorenzo and then were given free time to explore the city before meeting back up for dinner. I can't say what everybody else did, but as for my little group, we wandered around the city taking pictures of the picturesque small, Italian city as well as finally got Italian gelato — the first of many gelatos of the trip.

For dinner, we went to this restaurant (Crotto Quartino) where we experienced much more than we could eat. The first course was thinly sliced meat that had been dry cured; the second course was some pasta dish with so much butter and cheese; the third course was different meats (like sausages and ribs) with polenta; and dessert was a desert pizza of sorts with shortbread cookies. Afterward, we got to try their restaurant's homemade lemon liquor, which was similar to limoncello. The restaurant dry cured their meat in their cellar, which was made from rock! Just like we had discussed at Comune di San Giacomo. Catching almost everybody by surprise, the waiters came to our table with a dessert and sparkler stuck in it, singing Happy Birthday to Reto.

But the thing is, it wasn't Reto's birthday. Turns out, after seeing another party at the restaurant celebrate a birthday, somebody had the grand idea to tell the staff that it was Reto's birthday. It was hilarious, but little did we know it was only the start of quite the running joke for the entire trip. After dinner, we got to visit the cellar and see the meats hanging from the ceiling and drying (as well as trying more of their liquor). Finally returning to the hotel, a lot of us — including myself — promptly passed out. Tired, and ready for the next day.



Fig 1. Breakfast at Albergo Vittoria.



Fig 2. A heavy fog and light drizzle greeted us that morning.

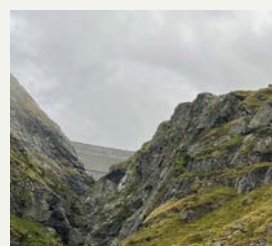


Fig 3. Valle Cardinello.



Fig 4. Reto explaining about the larch.

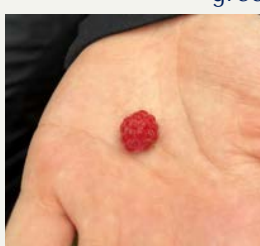


Fig 5. A wild raspberry found on the trail.



Fig 6. The bridge across the stream.

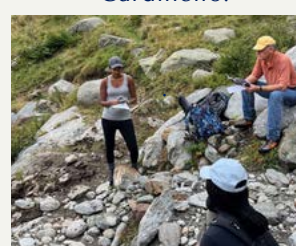


Fig 7. May giving her presentation next to a lot of cow poop.



Fig 8. The houses at higher elevations



Fig 9. Comune di San Giacomo, and the large rocks and trees protecting it.



Fig 11. First Gelato in Italy



Fig 12. Reto's 21st Birthday — the first of many to come.



Fig 10. Chiesa di S. Lorenzo.



Fig 13. Dry Curing Meats in Rock Cellar.



Fig 14. My rendition of the rock cellar.



Fig 15. Leebit in Valle Cardinello.



Fig 16. Leebit in the small town in Valle Cardinello.

AUGUST 18 (MORNING)

CHRISTINA VOLPE

When I woke up this morning to gorgeous weather, I knew it was going to be a great day! Today is our first full day in Chiavenna and the breakfast here is amazing! Maddie and I were so excited to see fresh figs as an option and they were delicious! Once we finished breakfast, we all gathered together outside the hotel, and, per usual, I immediately asked Steffi if I would need one of her hiking poles (if it wasn't for those, I'd be down in a ditch still in Montespluga), but she said today wasn't a hiking day. We then started walking and, first, we stopped to observe a fountain in a small square along the way. Here, Reto told us that the fountain has been used to quench the thirsts of both cows and people for centuries (sketch included below). Part of the fountain was made from a special rock called soapstone, or, as the locals call it, potstone, which is a soft rock that is easily carved like wood. It is quite prevalent in the area and used for so many different things from door frames to pots for cooking (where it gets its name!). Reto also explained that it's very common to see inscriptions carved into the rock, which typically include the date the structure was constructed. We saw that this fountain was built in 1732 based on its inscription. Another type of rock that is prevalent in this area is serpentinite, which contains the mineral serpentine. Chiavenna is famous for serpentinite quarries dating back to Roman times.

After we were done observing the fountain, we began walking toward the river Mera and Reto told us that houses typically begin rotting between the soil and the house's base but that, in this area, this is extremely uncommon since the rocks that can be seen at the bases of all the buildings aren't prone to rot like say wood is. He then told us to keep an eye out for differences in the physical qualities of the rocks we were observing such as variations in their texture, color, and weathering in order to prepare for a secret assignment he said he'd give us later in the day. On the way to the river, we stopped by a gorgeous palace called Palazzo Salis. It is now a bed and breakfast but was originally built in 1754 (around the time most buildings here were built) by the Salis family who was famous in the area. The palace is located in Chiavenna because, around this time, aristocratic families living higher up in the mountains moved to the valley as they saw the potential the city held to become a key stopping point in the trade industry as it's located between two major mountain passes. Reto then told us that the paint used for some of the outlining on the palace was actually a mix of hematite, which has a rusty red color, and titanium dioxide which, in combination, can make different paint colors. He further elaborated that white paint always contains titanium dioxide and when you mix that with something containing iron, you get a reddish color as seen circled in the photo below.

After this stop, we found ourselves at the Mera River, which many of us had taken Instagram pictures at the night before further downstream.

When we looked out from this view, however, we saw smokestacks and other remnants of the factories that were once here (picture below).

These factories were powered with hydropower and Reto told us about one old factory that used to make pasta flour that had since been turned into a museum and was still run using hydropower! Now many of the industrial buildings of the past have been converted into residential apartments, and it was fun seeing how these newer buildings blended in with the homes that have lined the river since the Middle Ages as their location on the river provided easy sewage removal. On a sadder note, upon closer inspection of the river itself, many of us noticed that much of the riverbed was exposed and both Steffi and Reto expressed concern that the river was a lot higher when they last came two years ago. If there is one thing I think we've all learned so far this trip it's that climate change is really affecting regions like this one. After this solemn moment, Reto pointed out that all the bridges that cross the river are made of huge, all-natural slabs of rock.

We then turned our attention upward to the various vineyards lining the mountains around us. This scene was immediately different from that of Montespluga, since Chiavenna is at a much lower elevation and therefore has a Mediterranean climate that enables fruits to grow. This really hit home how important the drastically different topographic and climatic conditions of the Alps are to things like the vegetation, lifestyle, and culture of Alpine regions. Surrounding the vineyards were numerous of what we learned were mostly chestnut trees, which have been a food staple in this region for the poor for centuries. Unlike in the US, forests are communal properties here, so anyone can go and collect whatever findings from the forest they can get their hands on. Like everything else, however, in moderation of course. For example, mushroom hunting in the forest was a common pass time that the city then had to regulate since people were overharvesting them.

We then hop, skipped, and jumped over to the botanical gardens and archeological museum Ca Rossa, which translates to the fitting name of "Red House". Here we saw a very deep valley in between two hills that had a very deep incision running between them. More intriguing to me, however, was the fact that the pavement looked almost like modern art (see pictures below).

We learned that the pavement's donut-shaped rocks were the leftovers or "rejects" from carving nesting pots from potstone/soapstone. These stones were then either laid flat or on their sides to create a design that doesn't just look cool and reduce waste, but also makes the road more textured and increases traction (which based on the slipping I did earlier in the trip, I was very grateful for!) This was representative of the low-waste culture many regions like this one have had for hundreds of years, as there are no landfills near here and certain resources can be pretty scarce in the Alps.

Going back to the incision, we observed how rounded and smooth the rock

surface was and noted that one side of the gorge's rock was darker than the other due to a lack of sun exposure. So cool! We also learned that this gorge was once a soapstone quarry and that the larger holes in the rock were made when the stone was carved out of the bedrock. The smaller, size-consistent holes we saw are where quarrymen attached the wooden scaffolding they stood and hung on while mining. It was so interesting to me that the entire gorge we were standing in was man-made! All the work was done with a chisel and a hammer since soapstone is very soft, but even so, I couldn't fathom how much physical labor it took to make the gorge. Interestingly enough, soapstone can be found around the world! For example, the Inuit culture used it to make statues.

We continued through the botanical gardens until we reached a beautiful lookout point overlooking the city. Here, both Dina and Luke gave their presentations and Steffi drew two beautiful sketches of our view (photos below!).

Dina taught us about cultural development within the constraints of Alpine topography. She started her presentation by giving us a geographical description of the Alps, saying that they span over eight countries and divide the North, Mediterranean, Adriatic, and Black seas. She then explained that agriculture today has declined in the Alps but was first thought to have appeared here around 4500 BC, which attracted migrants from Germanic tribes. The current decline is due to the fragility of resources (which climate change has worsened) and the fact that, nowadays, more and more people want to live in cities. She then described some of the economics of the Alps, saying Innsbruck is the secretarial headquarters for the alpine agglomerations. This was a nice segway into talking about the importance of tourism in the Alps, an industry that boomed after WWI and has culminated in the over 540 million overnight stays this region now sees every year. It is the second most important tourist destination in the world, and Alpine people have adapted their environments to fit the demands of tourists. These adaptations have included dedicating more money to infrastructures like ski lifts that bring in thousands of tourists.

I think my favorite part of this presentation was hearing about the cattle drives that have occurred here every year for thousands of years. In the early summer, farmers herd the cows up the mountains to feed in the pastures that grow above the tree line, which are covered with snow in the winter. Then, in September, they bring them back down to spend the rest of the year in the valley. For these drives, the cattle are decorated with pine needles and other local flowers.

Dina also informed us that alphorn blowing is yet another culturally significant activity in the Alps. The alphorn is one of the first documented instruments in the Alps and was used primarily to communicate with cattle and people in the valley when one was high up in the mountains. It was so cool to learn that it takes a whopping 70 hours of manual labor to carve one of these horns! These alphorn makers are incredibly talented!

Another small tradition in the Alps is flag throwing, which started in the

Middle Ages. At these events, the flags are not allowed to touch the ground and there are many kinds of swings one can perform. Dina also covered food in the Alps, which all sounded heavenly. She explained that the food was characterized by isolated rural life and noted that the vast size and climatic differences across the Alps had major impacts on the cuisine depending on where you visit. The food is very much use-everything-you-can style, and the Swiss especially value making sure their food culture stays strong. In fact, there are over 400 different Swiss foods in the Swiss encyclopedia including raclette, pierrade, and rösti (which was incredible!).

Then jumping to the most common belief systems in the Alps, the main religion across the board is Roman Catholicism, but there are also a fair number of Protestants. Dina also pointed out that there are huge linguistic differences here, with people speaking French, Italian, German, Romansh, and more, with the main driver behind these major differences being the topography of the Alps. Since most people historically have lived in the valleys, it makes sense that the natural mountain barriers caused divergence between cultures and their communication systems.

Reto then piggybacked off of this explaining that the true borders we have today across the Alps are arbitrary. To further explain this, he used the example of the Italian-speaking people who live only 15 minutes away from us but have been considered Swiss and not Italian solely after the border's creation at the Congress of Vienna in 1814-1815. Speaking of borders, we also learned that there is very little border control in the mountains across European countries, which is the reason why we didn't need to show our passports upon entering Montespluga. Reto actually told us a funny story about his friend who was hiking in the mountains when all of a sudden, a helicopter came down to check his ID because they thought he was a smuggler. I was shocked to find out that professional smuggling groups are actually very common in this region because of the loose border security! Even though Switzerland is not in the EU, once you're in the continent Europe you can disappear without a trace. In fact, many clever businessmen in Europe leverage this lack of border security to their advantage to legally get out of certain taxes and customs laws. However, transporting goods across the Alps is no cakewalk regardless of if you get out of a tax or two along the way, which led us smoothly into Luke's topic.

Luke gave his presentation on the subject "From Hannibal's traverse through the Alps to electric cable cars". He explained that the Alps are a very isolated region and that war, trade, and what he coined as "adventure scientists" were the primary motivators for developing this region. For the war section, he described Hannibal's trek across the Alps around 300-200 BCE. Luke explained that Rome had made a border for Carthage, which is where Hannibal grew up. Hannibal, however, did not like this border so he decided to wage war on the Romans. He braved the Alps with 90,000 troops, 14,000 cavalries, and some elephants and

began his journey by defeating some Celtic tribes in Central Europe. He finally made it to the Alps in November having lost 60,000 troops and a decent amount of cavalry at this point. In short, it took 14 days to cross the Alps and, in total, it ended up being a 9-month-long surprise attack on the Romans. Hannibal was victorious and then gallivanted around Rome for the next 14 years. He is considered to be the first main traverser of the Alps. Another war wagger to cross the Alps was Napoleon Bonaparte in the 1800s, who tried to mimic Hannibal's surprise attack when attacking Italy. However, unlike Hannibal, Napoleon's army was thwarted by 400 Italians at Fort Bard, which delayed Napoleon by two weeks. Luke then explained the significance of the Gotthard railway, which was made to maximize military defenses as you want to avoid war in the mountains. The reason why can be seen using the example of WWI when the Axis Power Italy disastrously had troops fighting at 10,000 ft in the mountains with war skis and carved-out lookout nests. Luke then explained that starting around 500 BCE, a long line of trading was established in the Alps. Three roads that really blossomed due to trade with the arrival of the Romans in the Alps were the Splügen Pass, Great St. Bernard Pass (St. Bernard dogs were made famous at a hostel here in 1034), and Brenner Pass. However, in places like St. Gotthard Pass, it was still very dangerous to cross the Alps, which is reflected in one of the bridges in that area being called Devil's Bridge. Reto explained that this name comes from the fact that often when bridges were constantly being destroyed due to natural disasters in the past, people blamed the devil for these events. The story goes that, when replacing the bridge one time, the people made a deal with the devil that they would sacrifice the first person to go across it if he promised not to destroy any more bridges. However, when it was time to sacrifice someone, the people sent a goat across the bridge which angered the devil, causing him to destroy yet another bridge. Yet, people still crossed these passes, meaning they were highly motivated by their desire to trade.

Luke then described the adventure scientists who braved the Alps. These were people like the De Luc brothers who, in the 1700s, conducted experiments to see the effects of various pressures on the boiling points of water, and did so by following the advice of locals as to which ridges they should climb (P.S. another thing we learned on the trip is ALWAYS listen to the locals!).

Luke then explained how tourism slowly started to creep in and influence the Alps. Benedict de Saussure played an important role in popularizing various trails and specifically Mt. Blanc by offering a reward to anyone who could climb it. At this point, the Alps began to represent an escape from industrialization and romanticization, which made it quite attractive to people. Then around 1913, skiing became a major industry in the Alps and brought in more people than ever before to the region, directly influencing the lives of the locals. An example of this is that now alongside the 500 million skiers that visit the Alps each year, local farmers also ride up the mountains in cable cars to save both time and energy while working.

After a round of applause for Luke, Reto piggybacked off this tourism discussion and told us about how the British spearheaded tourism in the Alps. It started when two British men successfully scaled Mt. Matterhorn, but it's important to note they lost a few of their friends who went with them in the process. This again shows that you should ALWAYS listen to the locals because they are aware of the numerous natural hazards that occur in their area. These Brits employed mountain guides (which is still an industry in the Alps today), but, unfortunately, even professionals can't always predict what will happen out on the mountains. Actually, we learned that mountain conditions are becoming increasingly harder to predict as temperatures continue to change rapidly in response to climate change. Reto then explained to us that when hiking on a glacier you MUST be roped to other people because underneath the snow, which looks sturdy and uniform, there could be massive crevasses. These are formed the same way a split in a brownie forms when you break it in half with both hands. In the case of the glacier, when the ice moves over a ledge or something with a similar sudden decrease in height the ice toward the top of the glacier cracks while the bottom stays intact. This happens because the top of the glacier is cooler and therefore less flexible than the bottom of the glacier, meaning that it is prone to cracking. Anyways, if you fall into one of these cracks you can imagine you aren't getting out alive if you're alone, so your peers must be able to hold you up. All of this is to say that if you have aspirations of becoming a serious hiker or mountaineer, you need to consider all the dangers that go along with it and know what you are doing before setting out on these types of adventures.

Reto then pointed out the Splügen Pass on the map, which was the shortest pass of the three mentioned previously, which is why the Romans tried to use it. However, the Romans ended up taking a different route that went through Chiavenna so that they could use their carriages to carry various materials with them, and it ended up being the only passable road between Italy and Switzerland. This alternative route ran from Chiavenna through the Engadine all the way to Chur (the oldest town in Switzerland that was once the seat of a very powerful bishop because his town was on this important trade route). Different stations were set up along this route so that the horses could be watered and fed, and you can still see Roman pillars left from this time along this route today. Chiavenna was actually an important access point to go north in 15 BCE when the Romans wanted to conquer Celts, but the Romans only occupied the city until 400 CE. Based on how out of breath I was after our few-hour hike in Montespluga yesterday, I couldn't fathom how much effort it took to move both people and resources across these routes.

However, luckily for people like me, when tunnels came on the scene in the Alps everything changed. In 1872 the 18-kilometer Gotthard Tunnel represented an incredible human feat, as it was dug out entirely by hand (again, people are highly motivated by trade as you can see!). After its completion, the importance of the

Splügen Pass decreased dramatically as nearly all traffic goes through this tunnel, even still today. Later, a new 57-kilometer tunnel and special high-speed train were built that drastically decreased the travel time between Switzerland and Milan, Italy. The idea for this train came from locals getting upset with the amount of pollution large cargo trucks were emitting while driving goods between the two countries. Now, instead of driving through the mountains, trucks are loaded onto the train and picked up by their drivers in Italy. Shockingly, this railway was built both on time and on budget (unheard of, I know), and also required the best drillers in the world (the South Africans) to complete. Workers used a huge drill and a conveyor belt that carried the rubble out of the tunnel. They drilled from either side of the mountain and vertically from the middle. They worked 24/7 and the project was a success! The crew drilled out 27 kilometers from either side, and they were only off by 2 centimeters, which is incredible considering there is no GPS underground and all measurements have to be taken with lasers. So cool! Additionally, true to the low-waste Alpine cultural tradition, approximately half of the rock they drilled out ended up going back into the tunnel in the form of concrete used to help structure the tunnel. Today, this train goes 200 mi/hr and has reduced a large amount of the air pollution in the area.

Another billion-dollar train was also constructed. The Swiss paid for and built the tunnel, but the Germans and Italians had to pay for the infrastructure. The Italians paid their share, but the Germans are notoriously horrible at holding deadlines and budgeting, so they were monetarily punished and their trains still aren't connected to this tunnel. However, these trains are much better for the environment.

After this lecture, we walked up the rest of the stairs to the highest point of the fort. I still can't believe we (and some adorable dogs) stood on an actual fort/castle today! So fun! Here, Reto showed us a map (included below) and explained that the yellow is more or less what the medieval town of Chiavenna would have looked like.





AUGUST 18 (AFTERNOON)

DANIEL BARRA

The second half of our day in Chiavenna began with a rather unfortunate bang. As we were descending from Parco Botanico Archeologico Del Paradiso, Luke misstepped while walking down the stairs and rolled his ankle. Little did we know, this would be the first of the onslaught of rolled ankles which would plague the guys on the trip. Reto sprinted to the hotel to find bandages and medication for Luke, yet another reminder of how in-shape Reto was (and how out of shape we were!).

As we waited for his return, an old Italian man approached us. He must have recognized us as the large group of American tourists that we were, and he launched into a sales pitch about a local building. With Reto gone, Luke was our only Italian speaker and the only one who could. Crippled and with nowhere to go, Luke was forced to sit there as the man persistently tried to convince him to go to this waterfall. Finally, the man left, but not after leaving us with a massive stack of business cards.

Once Reto returned, we were given our first assignment of the trip: find and document the materials, characteristics and years of the door frames and buildings in Chiavenna. We were to meet up back at the hotel by 5:30, giving us ample time to eat and explore the whole city. To minimize the effort, we split into four teams. Chase, May, Nikki and I formed a group covering the east side of the city.

As excited as we were to document the doors of Chiavenna, something else took priority: lunch. We found a little cafe in one of town piazzas and got a table just as it began to pour. Nikki ordered an amazing pesto pasta with olives, even though she hates olives and refused to eat a single one. May ordered a delicious looking salad with fresh Burrata and tomatoes. Even though we knew we were having pizza for dinner, Chase and I could not help ourselves and ordered two large pizzas. As we ate our delicious meal, we watched as the other groups ran around the piazza in full rain gear.

Once the rain had died down a bit, we embarked to study our section of the town. As we walked through the city, we made note of all the gelato shops. We were all surprised by how beautiful the city was. From the side streets to the town center to the mountain drop in the background, everything was picturesque. After we had our exploration, we met up with Reto at the hotel. From there we headed to Museo del Tesoro, the museum belonging to the Church of San Lorenzo.

Within the Museo del Tesoro was a massive basin dating to 1156 carved from a single piece of soapstone. This basin was used as a baptism fountain and carved on its side were the scenes of baptism. Importantly, all three major classes of the town were depicted on the side of the fountain: A blacksmith represents the low-

est class, a town person on the top of the tower represents the upper middle class, and a man riding horse with a falcon perched on his arm represented the aristocratic class. The whole class was shocked by how large the basin was. You could have baptized the entire town in one go! Christina and I also noticed how the baby that was carved on the basin was abnormally large. Maybe they did need such a big basin after all!

After exploring the baptism fountain, we entered the 16th – 18th century Basilica of San Lorenzo, which was built after the baptism foundation. This was our first Italian church on the trip, and it was so different from any of the Swiss churches we had seen thus far. The interior was elaborately decorated with murals, gold detailing and black, white and pink marble covering every inch of the church. In my opinion, the decoration was a little too intense. I preferred the simpler decoration of the Zillis Church, but I might be biased because that was my presentation topic.

Upon exiting the church, we discussed the findings of our scavenger hunt. We noticed that the Westmost doors seemed to be older: originating from the 16th -17th century. These doors were made from soapstone, and often had intricate carvings. Plaques next to these doors indicated that the buildings often belonged to aristocratic or notable families. Interestingly, those that were westward facing were much more weathered. This was because soapstone is a relatively soft stone. As such, it weathered over time from the wind and rain coming from the west. Meanwhile, the newer doors, often ranging from the 19th to 20th century were built from hard granite, and as such were simple, but unweathered.

After sharing our findings, Reto revealed that the restaurant the group used to go to had been shut down. He had to find a replacement in the small town that could take 16 people for dinner, and the only good one available didn't have a reservation until 8:45 pm. To make up for the late dinner, he told us to meet up in 40 minutes at the bridge for a little surprise.

With our free time, we explored all the shops in the town that had been closed when it was raining earlier. There we watched Thomas buy a pair of pants that would eventually become part of his fashionable, yet highly impractical hiking wardrobe. We also made our way into a little shop where we schemed a little surprise of our own for Reto. We bought candles spelling out Reto to surprise him for his 22nd birthday at dinner. Convinced that we were getting gelato as our surprise, Chase decided to skip on getting gelato, a rare occurrence.

Unfortunately for Chase, the surprise was not gelato. Instead, we went into this beautiful little cafe balcony hanging over the river. There, we drank white wine and ate a charcuterie board. It was there that our group realized we prefer whites to reds. This was one of my favorite memories of the trip. The view was amazing, the wine, meats and cheeses were delicious, and the conversation was great. We learned more about Thomas's complex love life and were surprised to find out

that Dina and Saige had been sharing a seat the entire time. We were unable to finish our cheese platter, so Reto came up and asked whose fault it was. I felt so betrayed when everyone at the table pointed to me. Reto said the punishment would fit accordingly.

He brought us to a corner of the town where a shackle was chained to the wall. Thankfully, the shackle had recently been shut, so he was not able to lock me up. There, he explained that town thieves and criminals would be chained to the wall where the public could mock them and throw rocks at them. Hearing that, I became increasingly grateful that he was not able to lock me up.

We then headed to our dinner restaurant, however it still was not ready for us, so we stopped by a gelato shop for a pre-dinner gelato. We loved how cheap the gelato was (only 1.5 Euros per scoop!). I had pistachio and it was amazing. Chase had his 12th gelato of the trip.

Finally, we were seated at the restaurant. My table ordered white wine after being inspired by our snack. The menu was only in Italian, so we had to ask Luke to help us translate. Dina, Nikki and I were unable to determine which pizzas to get so we ended up splitting three pizzas among the three of us. This was somewhat of a controversial restaurant for my table. I personally like the pizza, but May said her cheese tasted like raw milk. The table was split as to how good the pizza was.

Once we had finished our dinner, we sprung our surprise on Reto. The waitress came out with a cake with the candles we had bought spelling Reto. Together, we sang happy birthday and celebrated his 22nd birthday. Reto said he was shocked by how quickly he was aging, since we had celebrated his 21st birthday the night before. The cake was amazing and so unique. No one at our table was able to exactly describe what it tasted like. For me, it tasted like a meringue with frosting, but even that description does not do it justice.

Exhausted from our late dinner, we headed back to the hotel at midnight for our last night in Chiavenna. Our time in Chiavenna was one of my favorite days. It was a welcome break from our hiking and the history of the town was incredibly interesting. More importantly, it was one of the stops where our group bonded the most.



Fig 1. Luke cornered by the Italian man.



Fig 2. The business cards the Italian man left us with.

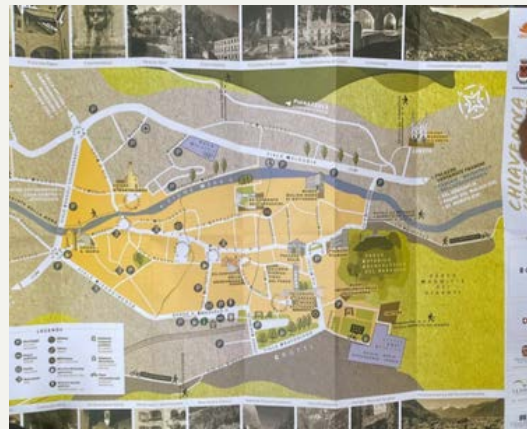


Fig 3. A map of Chiavenna with lines drawn to split up the town into three sections for the assignment.

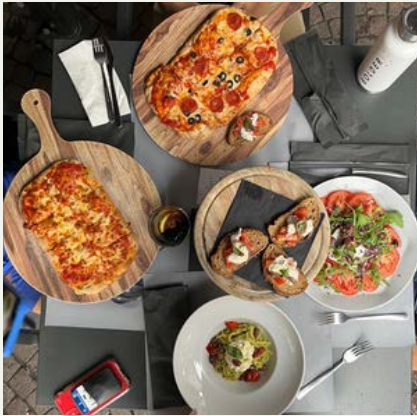


Fig 4. Chase's, May's, Nikki's, and my lunch.



Fig 5. The view from the church courtyard.



Fig 9. A drawing of the typical and simple granite door frames.



Fig 6. The basin with the aristocrat depicted on the side



Fig 7&8. The interior of the Church of San Lorenzo.

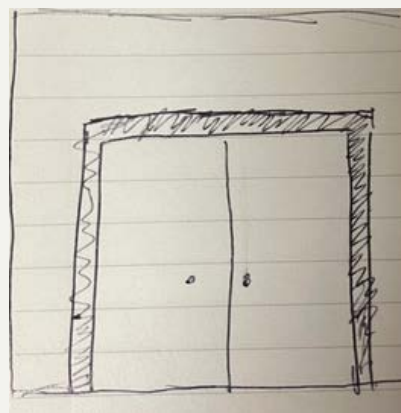


Fig 10. A 16th century soapstone door



Fig 11. Nikki showing Thomas how to fold pants.



Fig 12. The charcuterie board and wine.



Fig 13. The café balcony.



Fig 14. Saige with her pizza.



Fig 15. Reto celebrating his 22nd birthday.

AUGUST 19

SAIGE ROSHKOFF

Today we drove about 10 minutes from Chiavenna to Piuro to see the Palazzo Vertemate. We arrived at a Renaissance town where nobility lived centuries ago. We first stopped to look at a chestnut tree. These trees are very popular throughout the town and very valuable. The nuts are covered in a prickly shell in the shape of a ball. Green indicates unripened, and brown is ripe. A spiny flesh indicates it is edible. Chestnuts have been cultivated since 200 BCE when they started to take over the Alps. They are a staple food for being high in calories and nutritious with lots of vitamins. It was the food of the poor. Chestnuts are used in pasta, breads, sweets, creams, polenta, and have a brown color. The trees can live up to 500 years. Their wood is sturdy and used for outdoor items, such as furniture.

We then walked up a hill to get to the Vertemate palace. Along the way a woman was baking in a small hut and gave us fresh biscotti cookies! When we arrived at the palace we were greeted by our tour guide Marta. The workers were very excited to see a group from Philadelphia and exclaimed "76ers"! Palaces are common near Lake Como but the location of this one is surprising. This palace was built by the Vertemate family in the 13th century. It was a place for leisure, and to be self-sufficient.

The palace was made to show off the inside but not the outside. It was beautiful with magnificent artwork and architecture and gardening. The front staircase had a dog sculpture. Legend has it there was a happy dog that was so stunned by the palace's beauty it turned to stone. The palace entrance was first built to be open for horses and carriages to pass through. Visitors left signatures on the walls of the entryway. The palace hosted many town affairs. The hallway had mythological figures on either side.

One of the first rooms we visited was the entertainment room. It was covered in impressive artwork and old-fashioned furnishing. Our attention was drawn to a painting of the God of War as its eyes follow you throughout the room. The next room was the audience room, identified by its wooden panels which was common to the formerly Swiss valley. The walls retain heat. It hosted business meetings and even had a secret place for scribes to hide and collect information. Next, we visited the servant's room that had a vibrant green serpentinite stove where wood was put in to heat the rooms. After that we visited a more modern room, renovated in the early 20th century. Merielle Varsala lived there until the 1980s, and after that it was left to Chiavenna for the community. We walked up the stone steps to a hallway lined with wooden squares and rectangles on the ceiling that created an optical illusion of the hall appearing at different lengths depending on which side you are on. On the wall was a portrait of a resident ghost who was murdered for being a womanizer and travelling with lovers.

Upstairs we visited Napoleon's room where he was supposed to seek refuge because of religious friction, but he never came. We also saw a bedroom, a wardrobe room that was conveniently up the stairs for easy access for servants, and a master bedroom with painted women lining the ceiling. One woman was painted sitting down and holding the weight of the room on her shoulders. We then transitioned to benches to learn about some history of the region below two large paintings. The village had a surplus of trade and transportation of goods north to Switzerland. One night, there was a large landslide where a mountain came down and buried the entire village. Since then, the village has been rebuilt. We visited a couple more rooms. First the Zodiac room that depicts the year to follow the changes of the season. It had a Swiss pine ceiling and a goddess as the central figure. Next was the Bishop's room, which had an interesting choice of astronomy as the decor. He would visit to bless the church. At the center of the ceiling a staircase descends secretly.

We then made our way down to the main garden. Some skipped down the grassy isle to watch the wedding of May and Nikki. Next, we saw the church and back garden where there were more chestnut trees. In front of the palace was another large garden with grape vines, fruit trees, and lots of produce, such as watermelons and squash. It was strategically constructed, with a tilted ground to give grapes more sunlight and it had an elaborate water system distributed across the land. The palace now can be rented out for weddings and events.

As we were leaving the Palace it started to drizzle. We packed into the vans and drove across the border by the river into Switzerland to Bondo, where we prepared for our hike to Soglio. The hike was named the "Sound of Music hike" because our end destination is lots of grassy slopes that resemble those in the movie. The hike was uphill through lots of trees which was a little tough to do in the rain, but the beautiful grassy hills looking over the town were definitely worth it.

Luke was extra happy frolicking in the grass. After settling down, Maddie gave a presentation about Alpine architecture. Maddie was able to use buildings in Soglio as examples of her research. Alpine architecture is a balance of maintaining traditions, modern materials, and sustainability. Buildings are made of stone and wood primarily. Modern materials, such as glass and concrete, provide alternatives. We learned about the three main techniques for construction: Blockbau, ritti e panconi, and crossing.

We had a couple hours of free time to explore the town of Soglio. Most of the group sat in a restaurant and enjoyed Swiss hot chocolate (even though we were convinced it was Swiss Miss). On our descent back to the car we stopped to learn how the village of Bondo in the valley protects against landslides. Geologists are able to predict when mountains are going to collapse by measuring mountain deformation and wiring the area with sensors. There are walls that line either side of the river to catch debris.

A few years ago, there was an incident where 3 million cubic meters of rock fell down exactly as predicted. The villagers were all safe, but unfortunately 8-10 tourists died. We saw a new and safer bridge being constructed.

We drove to St. Moritz and stayed in the youth hostel. We ended our day with a group dinner and prepared for our long hike the next day,



Fig 1. Piuro.



Fig 2. Chestnut tree.

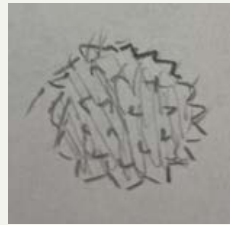


Fig 3. Drawing of a chestnut.



Fig 4. Fresh Biscotti cookie in front of a bakery.



Fig 5. Stone dog sculpture in front of the palace.

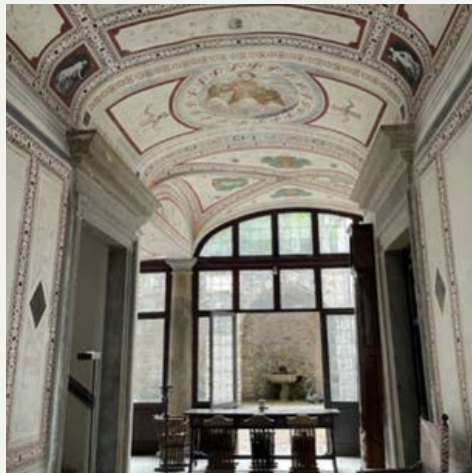


Fig 6. The palace entrance.



Fig 7. Signatures on the palace wall.



Fig 8. Entertainment Room.



Fig 9. Serpentine Stove.



Fig 10. Upstairs hallway.



Fig 11. Napoleon's Room.



Fig 12. Garden of the Palace.



Fig 13. Fruit trees in the palace garden.



Fig 14. Hills at the top of our hike.



Fig 15. Maddie's presentation.



Fig 16. Swiss hot chocolate.

AUGUST 20

LUKE FINKELSTEIN

Due to a poor grasp on how the comma works in the English language, our Youth Hostel in St. Mortiz was hilariously named the "Bad Youth Hostel." And while the accommodations were by no means as luxurious as those in Chiavenna, the hostel might have been more aptly named mediocre. At any rate, we woke up bright and early for a breakfast with too much bread and too few croissants. We hopped in the vans and headed on our way to the train station.

We had stopped the day prior at a continental divide. To the northwest, precipitation falls towards the Rhine and Atlantic; to the east, it falls to the Black Sea; to the south, it ends up in the Adriatic. When we arrived at the Morteratsch train station that morning, Reto taught us a bit more about the geography and history of the region. We learned that there are many glacial lakes by St. Moritz, beautiful shimmering blue opals by which we had driven to our hostel. St. Moritz is a famous winter Olympics town (it hosted twice). One can do a wide array of sports here, so athletes and adventurers flock to this spot from all over the world. And most astonishingly, Reto explained that the glacier we were about to see on our hike, the giant nestled far up in the mountains, once had its terminus here at the train station. That was in 1865. Now, because of warming temperatures from climate change, experts must re-draw the maps every year to keep up with the glacial retreat. The glacier will likely disappear halfway through the century. It was a good thing we were seeing it now.

Public transportation was free to us since we were staying in St. Moritz for three days. The train was sleek and efficient, reminding me again of the exemplary state of Swiss engineering. From there, we took the gondola at Diavolezza. In its Swiss (especially Swiss Alps) fashion, there were many languages spoken on the ride. I recognized English, Spanish, and Italian, just to name a few. As we waited for the gondola to start, Steffi and Chase decided to get in a quick workout. They each got in two pull-ups before their strength gave out, but it was still more than any of us endeavored to do. And even more to their credit, the metal bar was bending and shaking with greater strain than either of them.

The first summit was breathtaking. The Gondola led out to a viewing platform, where we could have marveled at the glaciers Pers and Morteratsch for hours. It was the culmination of a multi-vehicle journey, and it was only the starting location of the actual hike!

And so the hike began. Reto pointed to the peak in the distance, Munt Pers. It seemed so close. That was how we felt for the first 15 minutes, and when the peak looked no closer than before, we knew that our perception of distance was awry. However, it did not matter. All throughout the hike, we walked upon a ridge high

up in the mountains with the glacier always on our left. It was so magnificent that we stopped at many moments just to marvel at the view. Halfway through the hike, we sat down at a rocky outcrop above the trail. Here, Maggie gave her presentation about clouds with the glacier as a backdrop. She taught us about the importance of clouds, how the world would be much warmer and drier without them. We learned about cloud formation: water evaporates into water vapor. As it rises, it cools and enters a lower pressure area. The vapor combines with dust and other small particles into water droplets. Millions of these droplets combine to form a cloud.

Of course, there are many kinds of clouds, and Maggie taught us all about the variation in her polished handout. Cirrus clouds, for example, are high clouds that appear wispy and light. These predict good weather with no immediate precipitation. Interestingly, according to Maggie's research, there are more Cirrus clouds in the northern part of the Alps than in the South. Maggie also mentioned an important phenomenon with clouds brought on by climate change: a negative feedback loop. Drier weather in some regions leads to less moisture and therefore fewer clouds. That is a self-reinforcing model, for there is then less precipitation, even less moisture, so in turn less evaporation for new clouds. Climate change is accelerating this phenomenon.

In regions like the Alps, where weather is highly variable, human techniques of prediction are sometimes better than computer models. Reto agreed with Maggie that we rely too much on computer models, especially when it comes to telling weather on the mountains. In Philadelphia, computer models are just fine. "Oh my God, it's a cloud in real life!"

Walking on the trail below us was the cutest Samoyed puppy we had ever seen, and he was as fluffy as a cloud. Actually, the Samoyed was not walking at all; he was being carried in a cute little backpack! The dog belonged to a couple from the Netherlands—very sweet and speaking impeccable English—and that would not be the last time we saw them. We ended up bumping into the couple and their dog either four or five times that day. What a wonderful way to finish a presentation on clouds!

From the summit of the mountain, we could see the entirety of the Morteratsch Glacier and its moraines; the Engadine Valley; more peaks. It was an exceptional view, and well worth the hike. After we had lunch at the summit, Reto gave a lecture on glaciers. Glaciers are made up of ice; ice is a mineral, and a glacier is a type of rock. During the last ice age, which ended around 10,000-11,000 years ago, this entire valley was covered in ice—except for some of the crests. Now, it was just Morteratsch and Pers that remained.

Glaciers are powerful eroding and transporting agents. Only a glacier can move such large boulders and debris like those in the valley that we could see below us. Indeed, the great amount of debris is a sign of glacial activity: on each side of the glacier (and receding glacier), there are moraines, literally walls of debris that can climb hundreds of feet high.

Glaciers also leave debris at the front, called the terminus. The erosive power of glaciers leads to a U-shaped valley, another distinct characteristic of glacial activity.

Reto went on to teach us that the ice is flowing. Glaciers move because of gravity and temperature differentials within the ice mass. The bottom of the glacier is warmer because of the higher pressure, whereas the top is colder and therefore more brittle. When a glacier goes over a steep area, fractures called crevasses form because some parts of the glacier move faster than others. From our place on Munt Pers, the crevasses in the Morteratsch Glacier looked like innocent lines. In reality, these are hundreds-feet-deep crevasses that are death sentences for anyone who falls into one. Mountain climbers must therefore climb in groups and stay attached to each other via rope, lest someone slips.

Later that day, we had the chance to walk to the terminus of the glacier. This was a special hike, not just for the crisp air and swishing of the river; it was a history book of the glacier. As we progressed closer to the modern-day terminus, the vegetation became younger and shorter, until there was no vegetation at all. This is because vegetation takes time to grow. At the beginning, where the glacier had been absent for more than 150 years, we saw full-grown trees. By the middle, there were shrubs and seedlings; by the end, there was nothing at all.

There were signs placed along the trail showing how dramatically the glacier had shrunk. The first sign was just a little walk from the trailhead, and it said 1860. The terminus was at this spot in 1860, and now it was miles upriver. A little way on, we saw a rock with the year 1878 written on its face. This erratic block could only be deposited by the amazing transporting force of a glacier. And the trees and shrubbery around it were not here in 1878, having grown after the glacial retreat.

We later witnessed an amazing example of frost wedging. Frost wedging occurs in regions where the temperature fluctuates around the freezing point. During the day, rain falls into a crack in a rock. During the night, this water freezes. Ice has a volume 9% greater than that of water, so the crack widens from this force. When this happens repeatedly, over many years, the rock splits.

At last, we arrived at the new terminus of the glacier. It is remarkable how quickly the glacier retreated—startling, really. Reto and Steffi can remember three years ago when the terminus used to be at the bridge. The bridge was now hundreds of feet in the clear of the glacier. The new terminus was at the bottom of an ice wall, churning milky water out into the river. It was loud, furious, and majestic. The ice cave is a typical sight at the foot of a glacier, but it felt magical to us.

Next year, perhaps, the terminus will have migrated up the mountain even more.



Fig 1. Sign in front of the youth hostel.



Fig 2. Our train ride.



Fig 7. Erratic block and vegetation.



Fig 3. Steffi and Chase getting in a quick workout.



Fig 8. Frost wedging example on the trail.

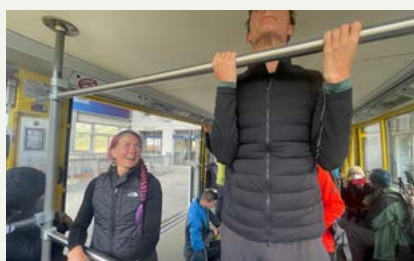


Fig 5. The kind man with his adorable Samoyed puppy.



Fig 6. Reto and Steffi observe the Morteratsch Glacier.

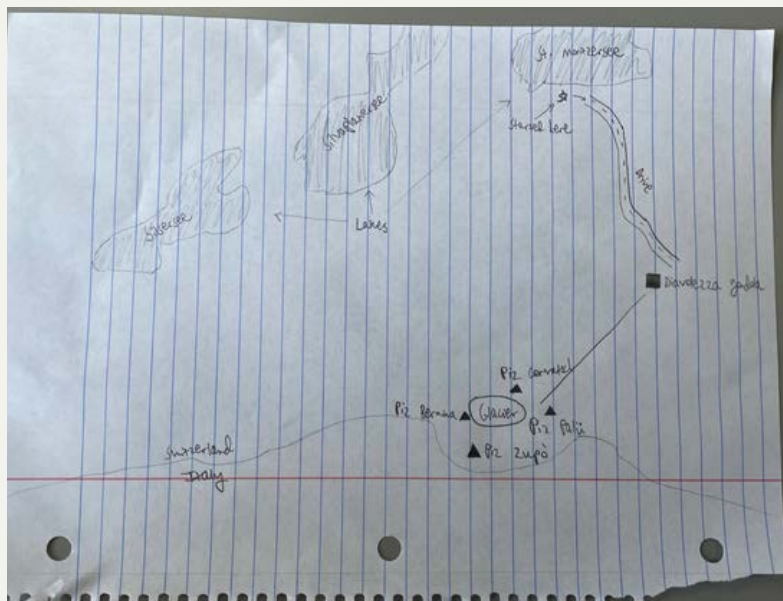


Fig 4. Sketch of the morning journey to Diavolezza.



Fig 9. Our group (excluding Reto, who took the picture) at the terminus of the Morteratsch Glacier.

AUGUST 21

MADDIE AHOLA

My alarm buzzed promptly at 7 am. I rose from the top bunk of our four-person “Bad Youth” hostel room in St. Moritz, took a second to wake myself up, then proceeded to get ready for a long day ahead of us. After packing for our 13-mile hike, I headed downstairs to fuel up with a lovely hostel breakfast of yogurt, bread, cheese, and, of course, a cappuccino.

As we drove through St. Moritz, fog covered the city and spread across the lake, bringing an eerie start to the morning (Fig. 1). Around 8 am, our vans pulled into the parking lot where we would board the Muottas Muragl funicular. As we slowly exited the vans, we were greeted by more hazy, dewy, crisp air. Despite the complete lack of sunshine, Luke decided now was the time to lather sunscreen. We all doubted him. There was no sun in sight. How could we possibly get sunburnt? “Just wait, once we get halfway up the mountain, it will be completely sunny,” Steffi warned. We laughed. About 10 minutes later, Steffi’s prediction had come true. We immediately rose above the fog and the sun shone bright. Looking over the valley, we could see the layer of fog that covered the area that we were underneath just minutes before (Fig. 2)

At the top of the funicular was a hotel, which Reto informed us generates 100% of its electricity from solar and geothermal energy. This hotel is called Energy Plus and also sells its surplus energy to the grid. After taking in the view, from which we could see Reto’s hometown of Samedan, we set off to begin our long hike. Part way through the trail, we encountered some cows, one of which clearly did not want us to continue. As this particular cow stood directly in the middle of the trail, Steffi mistakenly approached it... One thing led to another, and Steffi soon found herself on the ground, knocked down by a hefty push from the cow (Fig. 3). Cow: 1, Steffi: 0.

Shortly after this dangerous encounter, Thomas appropriately gave his presentation on The Cow (Fig. 4). After kicking off the presentation with a Doja Cat quote, he discussed the long history of cows: their presence in ancient cave paintings, oral myths of half-bull half-man creatures, tales of receiving good luck by rubbing cow testicles, and bull fighting. Cows are often used for labor, such as plowing fields, as well as for cheeses in the Alps. However, the Alps do not have ideal climate for year-long agriculture, so cows are taken down the mountains during cold months. In ancient times, many people hunted for bull horns and prize meat, which was a much more aggressive use for cows. The first cattle domestication did not occur until about 100-150,000 years ago. Cows also play a big part in religion. For example, in Hinduism, cows are not eaten, but rather used primarily for dairy. Now, cow protection is determined based on local laws, which can be dependent on religion in different regions.

Throughout history, cows have migrated all over the world and a lot of interbreeding occurred, explaining why now over 1000 breeds of cattle exist. The most popular cows were bred for dairy, meat, and leather. Given this extensive history of cows, the dairy cows that many Americans think of today have only been around for about 1/5th of the history of cows. There is also a lot of controversy in how cows are used for leather, especially in big name fashion brands, such as Gucci. Cowhide is tanned into leather through chrome tanning, which is not only cruel to the animals but also bad for the environment. Big brands such as Gucci have released statements about decreasing the use of chrome tanning. During the 19th and 20th centuries, with the Industrial Revolution, there was a large increase in private slaughterhouses. Although this began in Europe, it quickly expanded all over the world. Today, there are over one billion cattle, and the meat-packing industry is rapidly growing, causing animal cruelty, deforestation, and dangerous CO₂ emissions. Thomas concluded his presentation with a statement that I think sums up the complicated history and significance of cows in the world and the Alps: "Cows are very bad for the environment, despite their deep cultural significance."

After we continued our hike for a short bit longer, we stopped for the next presentation: Natural Risks and Hazards, given by Chase. Chase's presentation began with explaining the importance of taking care of the Alps, both to protect tourists and the fragile ecosystems. The Alps are made up of many different land features, such as valleys, cliffs, peaks, waterfalls, and more, which all make up its topography. Many of these land features were derived from tectonic plates in the Alpine Tethys.

Because of this unique topography of the Alps, there are also more risks of hazards. Since the 1400s, environmental hazards have been significantly increasing due to over-tourism and climate change. In the 1800s, 17 floods were recorded, but this number quintupled in the 1900s to over 103 floods. Some prominent disasters that Chase noted throughout the Alpine history include the landslide of Goldau in 1806, the rockfall of Piz Cengalo in 2017 (which we witnessed the aftermath of), and the "Avalanche Winter" of 1999. Another interesting fact that Chase pointed out about the Alps is the increasing amount of both floods and fires. Although there is such a dichotomy between these two hazards, they are both becoming more prevalent and pose threats to nearby villages and landscapes.

As mentioned before, over-tourism has a major effect on the increasing natural risks and hazards. More people in the Alps triggers more rockslides and degrades the landscape more and more, however, tourists are also less aware of their impact. Going forward, Chase concluded that it is up to big industries to protect the Alps from the continuation of over-tourism. As we were still standing on a hill, overlooking a valley filled with a rock glacier, Reto took this opportunity to teach us about permafrost, which is a layer that remains continuously frozen for at least 2 years in a row in the soil.

This exists about a meter under the soil. Rock glaciers are a permafrost feature, in which some parts are always frozen inside, but the majority is made of rock. These rock glaciers flow towards the valley as long as they are still active. As climate change worsens, the permafrost inside the rock glaciers begins melting more, causing more water to flow out of them. This essentially means that rock glaciers will eventually collapse and die, posing huge threats of landslides and flooding to the villages in the valley. However, knowing this, these villages have built large walls to protect themselves from landslides. Although, villages are taking action to protect themselves, the collapse of these rockslides is inevitable. They are moving rapidly at several centimeters per year (roughly the same scale as how the continents moved through plate tectonics). Reto explained that it is crucial to map these rock glaciers to know where they are and to take measures to protect nearby populations (Fig. 5).

Apart from impacting rockslides, climate change is also rapidly melting permafrost. Permafrost is dwindling in the Alps and even in other cold countries. The implication of this is that permafrost melting releases enormous amounts of methane. With this heavy melting, people are discovering life, such as ancient people and mammoths, that have been preserved for hundreds or thousands of years under ice.

After learning about rock glaciers and permafrost, we continued our journey and eventually reached Lej Muragl, where we were greeted by beautiful turquoise waters and... more cows (Fig. 6 and Fig. 7). A few of us even sampled the water using Sage's magical LifeStraw filterer (despite the large amount of cow manure that we later discovered further down in the lake).

After taking in the beautiful view of the lake (and many pictures), we were on our way to the other side of the valley, heading towards our final destination. But first, a couple more stops. One trek directly through the cows and one ancient shepherd's hut later, we paused for a lovely lunch in the midst of delicious blueberry bushes, where Daniel's bag got soaked with salad dressing, Thomas took a peaceful nap, and Maggie, Christina, and I ate enough blueberries to turn us blue. Then, Reto taught us a bit about the landscape. From where we were sitting, we could see where the tree line ended along the Alps, however, as Reto pointed out, trees were growing where we were, above the tree line. This is due to the warming climate. Trees are slowly growing farther up the mountain, which also pushes the cows farther up the mountain. Reto also pointed out the growth of lichen, larch trees, and patches of juniper, which can be used to make jam and gin.

As lunch ended, McKenzie began her presentation on Flora and Fauna in the Alps. McKenzie explained the effects of climate change on the rising tree line and earlier Springs. Although climate change is a natural phenomenon, humans are rapidly accelerating the rate at which the climate is changing, disturbing the natural flow of the ecosystem.

McKenzie then went on to describe a few of the most iconic animals in the Alps. First, is the Alpine Ibex. The Ibex lives at high Alpine altitudes and is the most iconic symbol of the Alps. Their dense and dark coat helps them stay warm and they conserve as much energy as they can by not moving much. Climate change is also affecting the Ibex because they are forced to move higher and higher up the mountain with increasing temperatures, rising tree lines, and changing vegetation. Next, the Alpine Chamois. The Chamois have smaller horns, but are found at similar altitudes to the Ibex. They avoid being out during the daytime to avoid the heat of the sun. Because of the increasing temperatures, young Chamois are swayed to stay even more out of the heat, which stunts their growth. Next, the Alpine Red Deer. This is the largest ungulate of the European Alps. They have antlers instead of horns and are found at lower altitudes. Next is the Alpine Golden Eagle. The Golden Eagles have no natural predators and rely on surprise and diving techniques to get their prey. One interesting fact that McKenzie told us is that the Golden Eagles mate once for life and work together to catch their prey. Last but certainly not least, the Alpine Marmot. The Marmot is a rodent, a ground dwelling squirrel. They switch their burrows in the Winter and Summer and go under their burrows if they see threats. During the Fall, they eat a lot before they hibernate in their burrows during the Winter. Although climate change generally means increasing temperatures, it also leads to more unpredictable winters, which affects the regular cycle of Marmot hibernation. However, climate change is also pushing them to higher altitudes, which means that eagles can't spot them easier, leading to higher survival rates. While this is a positive effect, the climate is also changing too fast for them to adapt.

With the conclusion of the last presentation of the day, we continued onward up the steepest and final part of the hike. After a lot of huffing and puffing, the view in the end was definitely worth it. On the right, we could see the small villages, including Reto's hometown, in the middle were beautiful blue lakes, and on the left we could see the Pers glacier and the hike we had done the day before (Fig. 8).

After taking in the beautiful view, we sat at the hut at the top of the mountain and enjoyed a little mountain snack. In the restaurant, I purchased a typical pastry of the region called Engadiner Nusstorte. This is a dense dessert made with nuts and honey and it was the perfect snack to fuel me for the rest of the hike down. Once everybody else finished fueling themselves with sausages, hot chocolate, cappuccinos, and cheese, we began the long journey back on the other side of the mountain.

On the way back, we saw a lot of old and new avalanche structures, built to protect nearby villages from inevitable avalanches in Winter and landslides in Summer (Fig. 9). These advanced structures are highly engineered to maximize their efficiency and protect the villages in the valley and mountain sides. Part way through the journey down, we passed through an area where Ibexes can be found.

Everyone quieted as we slowly walked in silence, keeping our eyes peeled for any sign of those majestic animals grazing high along the mountainside. Reto kept his binoculars out, hoping to see his first Ibex in the last 3 years, but, unfortunately, no luck. As McKenzie discussed in her presentation earlier, with worsening climate change, Alpine Ibexes are forced to higher and higher altitudes, and it is becoming increasingly more difficult to spot them during the hot Summer months because they stay in the shaded areas. The look of disappointment on Reto's face was devastating. Everything in his face and the way he talked about the Ibexes was all one needed to know about how beautiful they are and how important they are to the ecosystem in the Alps. I have my fingers crossed that Reto will see one next year.

A few hours later, with sore legs and sweaty foreheads we eventually reached the final leg of our journey around 4:30pm: a lovely leisurely chairlift that would take us down to the town of Pontresina. In pairs, we all boarded the lift and enjoyed the serene (and windy) view from the lift (Fig. 10). As Christina and I sat on our chair, we discussed how beautiful the hike was while clutching onto our hat and bags, hoping they wouldn't fly away.

Upon arrival to Pontresina, we strolled to the train station, hoping to catch the train back to St. Moritz. Unfortunately, we missed it by 20 minutes. While us students stood around leisurely chatting, I could tell that Reto and Steffi were working hard to come up with Plan B. Thanks to their quick thinking and resilience, we were soon waiting at the bus stop, eager to arrive back to our hostel to find out what was for dinner that night.

Only a short while later, we were all safely back at the hostel and the beautiful evening called us to stroll towards the lake and take a quick post-13-mile-hike dip. However, as the sun was setting and the air grew chillier, only a few of us braved the cold water for a brief 5 seconds (not me included) (Fig. 11 and Fig. 12).

After our lovely little walk around the lake, the few of us that were still out returned back to the hostel, exhausted after a long, but certainly wonderful, day of exploring the beautiful Alps of Switzerland. I returned back to my top bunk, curled up under the covers, and got some much-needed rest before waking up to another adventurous day in the Alps.



Fig 1. The fog across the lake in St. Moritz.

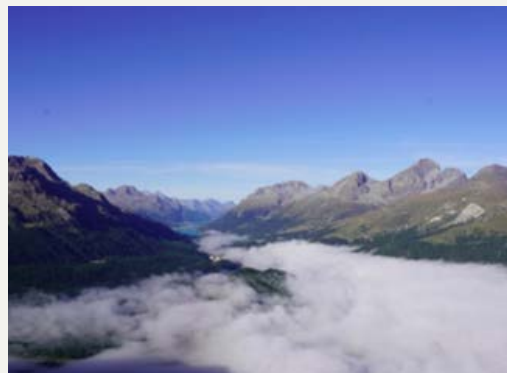


Fig 2. The fog covering the valley and St. Moritz (photo creds: Maggie Zhang).



Fig 3. Steffi vs. cow.

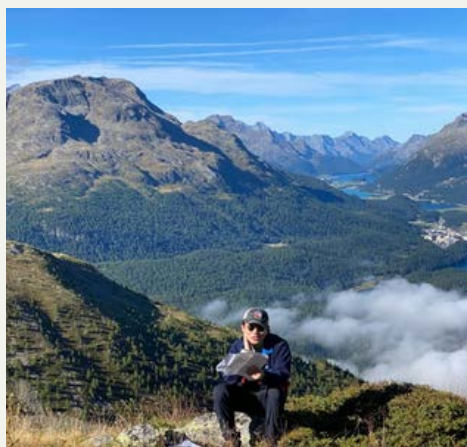


Fig 4. Thomas giving his presentation on The Cow.



Fig 5. Rock glacier.

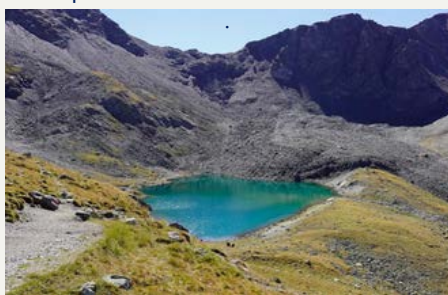


Fig 6. Lej Muragl (photo creds: Maggie Zhang).



Fig 7. Steffi staying far away from the cow (photo creds: Maggie Zhang)

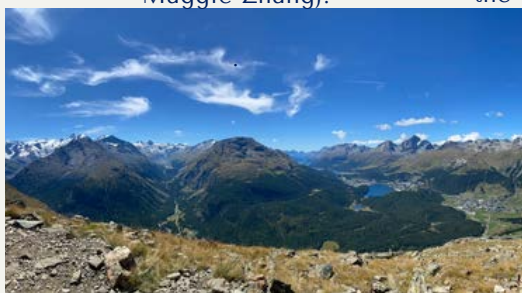


Fig 8. View from the top of Munt da la Bês-cha.



Fig 9&10. Sketch and image of avalanche structures on the mountainside.



Fig 11. View from the chairlift towards Pontresina.



Fig 12. Maggie and I on our evening stroll along the lake

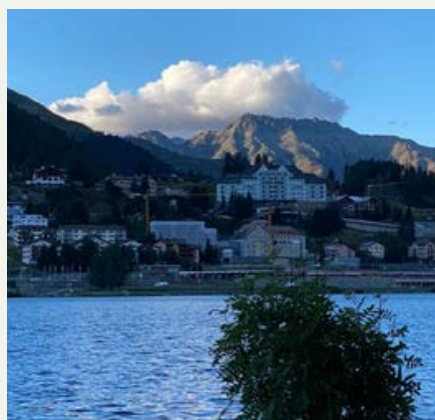


Fig 13. Beautiful clouds and mountains behind the lake in St. Moritz

AUGUST 22

CHASE KELLEY

Starting our day, the group's spirits were elevated despite an incredibly arduous hike the day prior. Reto had hinted that this day would be easy, which the entire group celebrated, especially Thomas who was incredibly exhausted due to the fact that the hike was not simply shopping around St. Moritz. We began the day in the hostel, and surprisingly the food was quite good. My picky self starved; however, most of the group would find something to eat that would help them take on the day. We also knew we would be visiting a bakery later so many were eager to transition from hostel cuisine to something a bit more refined and local. As we departed, we made our way to a city close by, naively to what was about to strike. Steffi and Reto were about to take us on the most steep village roads I had ever encountered. The entire group was dripping sweat by the time we reached the top, humbled by the natural topography of the area. This humbling trope was a common occurrence throughout our trip; however, something about that morning made it hit even more. Eventually we would arrive at the Auffangdämme dam and learn a bunch of interesting facts regarding its role in protecting the village below.

The Auffangdämme dam that was created to house debris from hazards like avalanches. The dam can hold 100,000 cubic meters of debris maximum, which alleviates a ton of damage from reaching the village. This investment was paid for 20% by the village and the rest by federal initiatives. Researchers in Austria work to innovate and create the best designs. If the rock glaciers above the village melt and collapse, this dam is designed to catch them. Bondo was a designated property but nobody knew another load would come down two days later. Overestimating is dangerous because it can be an incredibly expensive endeavor. Bondo has an excavation field where they put all of the debris.

After learning all of these interesting facts regarding the dam, we made our way to the local church which was sadly only open for an hour. This meant we were unable to visit, so we made our way to the town bakery.

Alpine bakeries and I have a unique relationship. I love pastries and will scarf down many croissants in the span of an hour; however, my nut allergy consistently causes problems at such establishments. One pecan or almond could shatter my very existence, so I had to be overly cautious when selecting my pastries. This meant I had to stick with old reliable, plain butter croissants. I ordered three and ate two swiftly like a feral rat. However, I did keep one for lunch which is displayed in the photo below. Overall, the bakery was lovely; May enjoyed her apple strudel, Dina liked her lemon cake, and many others left with full stomachs. Despite being well fed after the bakery, the feeling of being full was quite absent for me throughout the trip. My palette akin to a seven year old did not bear well in Europe and this meant any time we went to a grocery store that I went ham.

In Italy, the stores are pretty abysmal and lack a lot of American options; however, the wonderful, impeccable, enchanting Swiss Store named Co-Op would save me from my eternal hunger. It is here where we would stop and buy some snacks. I bought two croissants and two soft pretzels along with five Cliff bars and a Twix. This would hold me over for a bit and was a pivotal pitstop that completely changed the trajectory of my day.

After this pit stop Reto would treat us to coffee and tea at a local Cafe and it was a lovely addition to our morning. This is also where I created the nickname YUNG DEEN for Dina which would remain her only name for the rest of the trip. We cried laughing at this cafe and it remains one of my fondest memories of the group. After visiting the café, we drove and had a little pit stop to learn about dolomite and Edelweiss, which are native plants of the region.

Dolomite is calcium magnesium carbonate, and is a sedimentary rock that is colorful and sharp. Black lichen are apparent on these rocks and they're made of different materials. The rocks were formed along a fault line in the ocean, and vertical motion caused different types of rock to form together. Many different fragments compose this dolomite. Long axis and vertical axis rocks look incredibly different. We can determine the age based on the belemnite fossils that we saw within the rocks. All dating is relative due to the position of younger and older fossils. Cutting rock is instrumental in determining the species. Geometry and the way the chambers are oriented allow you to determine the species. We also learned about Edelweiss, which is a type of flower that is protected and only occurs in an area of this type of rock. Specifically, around limestones and other dolomite. After the stop to see the dolomite we drove for a bit longer, and would eventually stop at a lovely lake for lunch. This lake overlooked an enormous mountain and also had a Swiss train route following the entire area. This was a really cool spot to sit down for a little bit, catch up, drink some German beer, and relax. We would then drive to our next stop which would be the site for Nikki's presentation.

Nikki's presentation was given in Cavaglia and highlighted energy consumption and creation in the Alps. We learned initial vague elements of energy production such as the fact that energy produces electricity, and this electricity can be distributed for use. Then we were told that Switzerland gets about 60% of their electricity from hydropower which takes water from streams and utilizes them to create electricity. 30% of their energy comes from nuclear sources. Oil and Solar are about 5% each. Italy on the other hand has 50% come from fossil fuels, 15% hydroelectric, 8% solar, and a myriad of other energy sources. Switzerland has 30% nuclear power while Italy uses none, although nuclear power is decreasing in Switzerland. Furthermore, Switzerland's energy is renewable versus Italy is not renewable. Both countries have grown with renewable energy within the last 10 years. Switzerland is about 35% renewable while Italy's is 20%.

Switzerland has one of the largest dams in the world to produce hydroelectric power. We also learned about legislative action conducted by both countries that included achieving the goal of reducing carbon emissions by 50% around 2030. This goal was set via the Paris climate agreement which was signed by both Switzerland and Italy. The Paris Climate agreement also considered the usage of different forms of energy. It criticized how climate change is making hydropower vulnerable and emphasized how Solar energy is increasing in both Italy and Switzerland. One does not need a ton of space to create a lot of solar energy. Other sentiments expressed surrounded the issue of nuclear power which is considered too dangerous via contemporary standards. This has caused Switzerland to want to completely phase out such usage. Ultimately, Nikki's presentation illuminated many issues regarding energy in the Alpine region and how change is needed to create sustainable sources of energy for such a unique area.

After Nikki's presentation we went to a place called San Carlo which was close to a hydroelectric power station. This place was unique because there were an abundance of natural potholes saturated throughout the landscape which we got to observe. Our entire group actually went into one and saw how deep and large these potholes can become.

Reto then entered a mini lecture regarding glacial potholes and their polish. We learned when rocks are turned vertically it is much harder for them to have a polish; furthermore, the geography of the area makes it more susceptible to potholes. Specifically, in the area, the Glacier of Val Poschiavo flows down to Tirano and as the Glacier comes down it starts carving out parts of land at the bottom. The narrower the crevasses become at the bottom of the ice, the more likely the water flowing down in them makes potholes. Water flows faster and faster creating a swirl which contributes to the pothole. It is a pure accident that the holes occur. Reto then expanded further upon glacial polishing and asserted there was no glacier polishing on valley side of the hill; however, the brittle part of the glacier broke and created a part of the flow line.

After learning about the potholes one of the owners/maintenance men brought us all to his quaint dining area and we enjoyed herbal tea and coffee. It was lovely to relax for a little bit and taste some tea truly only found within that niche area of the Alps. Many of us bought it for our families and it was a great souvenir to bring home. After this stop we made it back to the buses and began driving to another village. This town would be called Poschiavo and Reto would immediately take us to a cemetery. However, this cemetery was different from a normal cemetery. It was in a building and many of the skeletons/heads were out on display. This was due to the fact the town did not have any more room to bury the dead. To resolve this, the town began digging up skeletons and kept heads and bones for safeguarding. Contemporary cemeteries have evolved from such techniques. The actual cemetery element of the building was gothic while the place that held the skeletons was baroque which was a unique juxtaposition we had not seen on the trip.

Reto then gave us 45 minutes to roam Poschiavo. Immediately my group went and bought Gelato. I bought two scoops of lemon as I always do and waited for the rest of the group. The town was serene and saturated in pastel colors so we took the rest of the time to explore.

Eventually we would depart from Poschiavo and head deeper into Italy which is where we would be staying for the next few days. We arrived at our hotel and I got a double room with Daniel. We unpacked our things and headed down for dinner. Daniel and I sat with Reto and Steffi along with two of Reto's Italian friends, one of whom was a geologist counterpart. Carmen (a fellow geologist) along with her husband did not speak English, so that left me, Daniel, and Steffi to talk for the night. We drank a lot of wine and explored many vast topics from unsuccessful dates to the Greek life culture at Penn. Eventually we would complete our dinner, and settle in for bed. This would conclude our day and leave us all eager to see what we would undertake now that we were back in Italy.



Fig 1. Auffangdämme Map.



Fig 2. Photo of the Dam.



Fig 3. Croissant. Fig 4. The Cafe. Fig 6. Daniel on dolomite.



Fig 7. Steffi & friends on dolomite. Fig 8. Edelweiss flower.



Fig 5. Reto on dolomite.

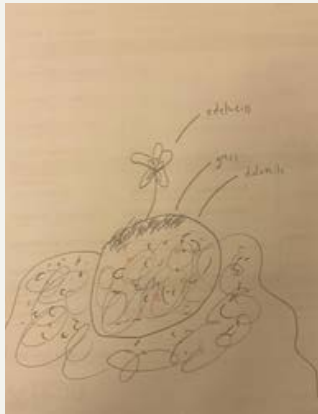


Fig 9. Drawing of Edelweiss & dolomite.



Fig 10. Daniel at lunch.

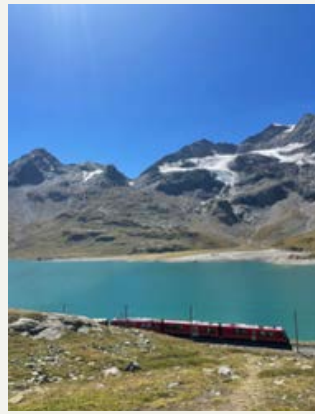


Fig 11. Our lunch stop near Bernina pass.

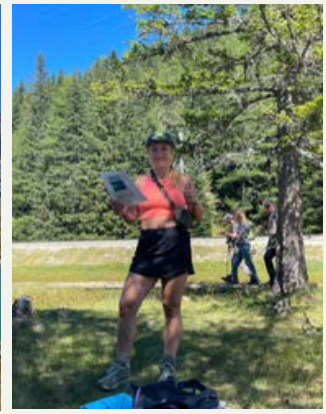


Fig 12. Nikki's Presentation.



Fig 15. Daniel in the pothole.



Fig 16. Our group in the pothole.



Fig 17. Gelato place in Poschiavo.



Fig 18&19. Flowers & buildings of Poschiavo.

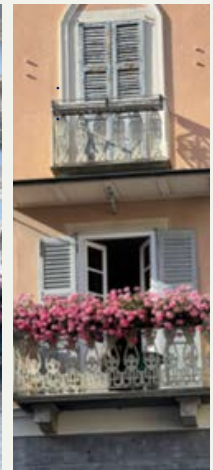


Fig 13. Image showing topography near area.



Fig 14. Graphics showing how potholes form in region.

AUGUST 23

THOMAS CHEN AND DINA LEYZAROVICH

To start the day, we met up with everyone for breakfast around 7:30 AM at the Hotel Chalet Rezia di Chiesa in Valmalenco. While the meal was not that memorable, the experience was because of an Italian men's high school soccer team that was having breakfast at the same time. They broke into the birthday song halfway through the meal for one of their teammates, so of course Luke jumped at the opportunity and told them it was Reto's birthday as well. We all sang to Reto together, and then hopped in the vans to get on the road by 8:15 AM.

Our first stop on today's journey was a pharmacy (not surprising considering the multitude of injuries accrued by the boys over the past week). After the necessary medical supplies were purchased, we stopped at Salumeria Delia Nani, where Thomas picked up his usual lunch of Pringles and bananas and Dina grabbed dried meat and apples. Outside of the small grocery store, we saw the friendly neighborhood dog, and a few people stopped to say hi.

Once everyone finished purchasing lunch for the next two days, we hopped back in the vans and headed to the Museo e Miniera della Bagnada, which translates to the Museum and Mine of Bagnada. At the museum, we each signed in and took a tour of the exhibits, which included videos that taught us about the four different types of rocks found in the mines at Bagnada: serpentinite, asbestos, talc, and soapstone.

The first rock, serpentinite (made up of serpentine minerals), is a greenish stone that gets its name from its snakeskin-like texture. Giant slabs of serpentinite have been quarried, distributed to, and used in local towns and cities since ancient times for floors, walls, roofs, and decorations as we saw around Valmalenco.

We were surprised by the second rock, asbestos, because of its reputation as a hazardous and possibly cancerous material. However, the specific type of asbestos extracted in this mine, chrysotile, was not dangerous. This mineral, due to its fibrous form and fireproof nature, was multi-purposed, used in the creation of fireproof clothing, engines, and even tablecloths (due to the risk of knocking down candles). Due to the expenses necessary to test the safety of the type of asbestos, however, chrysotile is often banned along with other types of asbestos in many countries.

The third rock was talc, which was discovered while mining for asbestos. It comes in two varieties: white talc is the one that is ground up and used in products such as cosmetics and lubricants and gray talc can be found in the dashboard of a car, rubber, and paints.

Talc is a very soft material, and it can be scratched with fingernails, as we all had the opportunity to experience for ourselves. However, its dust can be extremely dangerous when inhaled, similarly to certain types of asbestos, and as such, upon extraction, talc usually has to be cleaned prior to use.

Finally, we learned more about our favorite rock - soapstone, also known as potstone - that we'd already learned so much about. This type of metamorphic rock is a (gray) talc-schist, making it easy to carve (due to talc's softness), as well as a great insulator. As such, based on the name potstone, soapstone is often used to create cooking pots, but as we previously learned, the excess materials are often used in things such as door arches and roads, which we saw in cities like Chiavenna.

In addition to the videos, the museum also had several artifacts such as a water mill and machinery used to dig in the mines around the 1950s and onwards as well as the equipment used to turn rocks into usable products such as pottery.

Following the museum visit, we trekked up to the mine's entrance where we suited up in hairnets and hard hats to prepare to enter the depths below. As we walked in, we could tell that the caverns were much damper and cooler than the sweltering heat outside, although this temperature reminded Thomas of his typical dorm temperature and made him feel very sleepy once again. Meanwhile, Dina regretted not bringing an extra sweatshirt.

Carmen, a geologist who is well-versed in the history of this mine, and her husband Diego guided us through the mine, which was open from 1936 to 1967 with a total of nine floors. When the museum was opened, the infrastructure was updated so that it would be safe for visitors like us to enter. However, when the mines were in use, they were much more cramped and lacking in technology. For example, miners on the top floors would throw collected materials down chutes to the entrance floor and miners on the bottom floors had a pulley system they used to send materials up to the entrance floor.

Toward the end of the tour, we watched a video about the life of miners in the 20th century. Miners would typically work during the winter, when men were not as busy with agriculture. They often slept in the tunnels, despite them typically only being big enough to fit one person at a time. Unlike in modern times, the mines were much more dangerous — modern safety equipment such as the hard hats we wore and the nets covering the ceilings to prevent rocks from falling did not exist in the past. Lighting was also minimal, as miners relied on carbon lamps hung on wires throughout the mines. In addition, the ventilation system was not used frequently because it used too much electricity and caused toxic fumes to linger in the tunnels. As a result, miners would often pray to Saint Barbara, the patron saint of miners, for protection.

While only men could be miners, women and children played an important role in the mining industry. Women carried extracted rocks and minerals from the mine back down to town on their backs or on wheelbarrows, frequently doing multiple

trips in order to make more money. Meanwhile, children would often look through rocks on the ground for any extra asbestos.

Prior to the 1950s, there was little to no machinery used in the mines — mining was done exclusively by manpower. However, miners were able to use dynamite in order to expedite this process. Men would drill holes into the rock by hand in an arch shape to form tunnels, with the holes converging slightly. This process would take three men: one holding the jack in place, with two taking turns to hit the jack into the stone to dig the hole. As such, left-handed miners were very useful in this process, although they were very rare. These holes would have dynamite sticks composed of gunpowder and plastic placed inside of them. The miners would have to calculate the time required for the dynamite to go off so they could run to safety. Even when the process was expedited through the development of machinery such as drills, the process was still dangerous — drills often would cause severe vibrations that damaged the nerves in the hands of the operators.

We were shown other rocks and minerals in these mines as well, such as marble, dolomite, and magnesite. However, the most important mineral that was accidentally found was quartz. Because the owners of the mine were unaware that this quartz existed, the miners tried to sell the quartz by themselves, without giving a share of the profits to the owners of the mine as stated in their contract. As a result, the owners of the mine shut down the tunnels in which quartz was found, destroying many valuable quartz crystals, although miners would still break in at night through the emergency escape in order to mine this quartz.

Other rooms we toured included the dynamite storage room, which due to its damp conditions and wood contents continuously grows moss despite being cleaned frequently, and a newer performance room that is able to fit over a hundred people. At the end of the tour, we sang “Happy Birthday” to Reto in the performance room. One of the most memorable events that happened while we were in the mines was Maddie noticing a giant daddy long leg sprawled out on the back of Christina’s helmet. Luckily, Maddie was brave enough to pluck it off and throw it back into the mine.

After exiting the mines, we drove to a small church, the Chiesa di Santa Barbara, where we had a quick lunch outside. We then traveled to a serpentinite quarry, which also harvests asbestos, as it forms in the fault zone where rocks glide past each other (as evident by the green parts of serpentine rocks). As a result, we could see several holes present in the rocks where asbestos was extracted.

While these quarries were extremely useful for harvesting materials, they also tended to have large land dumps of unwanted rock waste, destroying environments. Unlike in the mines, where rock waste was dumped underground, these land dumps take up large amounts of space and limit the amount of habitat space for animals. As a result, some old quarries and land dumps are in the process of being naturalized and converted back to their former environments today, although the process is very slow.

Along the way, Reto recognized the man from the videos we had seen earlier in the museum, and then we followed Diego into a second cavern, although Thomas tripped several times on the rocky path leading up to it. There, we were able to see even longer fibers of asbestos covering the rocks.

We then drove to Campo Moro where we stopped at some tables (that were made of serpentinite) where Saige bravely gave her presentation on different types of rocks without any notes (she memorized it!). She described the three types of rocks: sedimentary (formed from sediments deposited by water or air, such as limestone), igneous (formed from magma, such as granite), and metamorphic (transformed by heat and pressure, such as marble). We also played a game where we guessed which rocks or minerals were used for which purposes, such as quartz being used for glass and granite being used for tabletops.

After a drive with many stomach-churning switchbacks, our final stop of the day was the Rifugio Zoia, a mountain refuge with a restaurant. While Dina chose to get another gelato (we've lost count of how many she had total), Thomas opted to get tipsy off of one of Steffi's recommended drinks, which tasted similar to a limoncello shot.

For dinner, we stayed at the hotel where we once again celebrated Reto's 23rd birthday with the help of the soccer team, and then a group of us decided to wrap up the night on Thomas' balcony, where we were able to stargaze with only minimal light pollution from the sleepy town of Chiesa.



Fig 1. May with her butter.



Fig 2. Shalese with a dog.



Fig 3. Chase and Thomas buying groceries.



Fig 4. Walking to the mine.



Fig 5. Museo Miniera della Bagnada.



Fig 6. Luke signing in while Reto laughs.

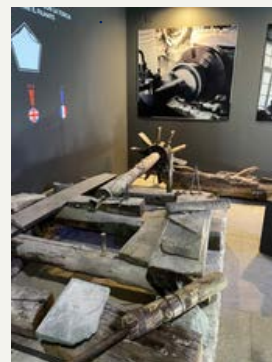


Fig 7. Water mill for pottery making.



Fig 8. Equipment used for processing.



Fig 9. Machinery used in mines.



Fig 10. Walking up to the mine entrance.



Fig 11. Suited up for the mines.



Fig 12. Steep and unsafe staircase used by miners.



Fig 13. Chute used to throw extracted minerals through.



Fig 14. Shrine of Saint Barbara.



Fig 15. Tractor-like equipment used for digging.



Fig 16. Drill digging dynamite holes in arch-like shape.



Fig 17. Selfie of Thomas, May, and Nikki in mines.



Fig 18. Moss in former dynamite storage room.



Fig 19. Performance stage area.



Fig 20. Video of life of miners in the past.



Fig 21&22&23. Walking along the serpentinite quarry, with landfills of rock waste.



Fig 24. Asbestos.



Fig 25. Reto, the "actor," and Carmen



Fig 26. Asbestos in cracks of caverns.



Fig 27. Saige giving her presentation.



Fig 28. Luke posing with his upside-down cap.



Fig 29. Luke at the refuge.



Fig 30. The Rifugio Zoia.



Fig 31. Dina's gelato.



Fig 32. The view at the top of the refuge.



Fig 33. May (and Nikki's foot) on the balcony



Fig 34. The stars visible in Chiesa.

AUGUST 24

SHALESE JORDAN

Today was a day like any other. I awoke in Hotel Chalet Rezia to the sound of my alarm blaring. Once again, I was pleased that my inane alarm did not wake up my roommate Maddie. This is not because Maddie is a light sleeper, but because she is extremely active in the morning. This morning's endeavor for Maddie was washing her clothes by hand and hanging them up to dry on our balcony. All of this was done before I had even opened my eyes. I committed to leaving my bed at 6:00 AM knowing that we were expected to be down at breakfast by 7:30 AM. Today, I wanted extra time to re-pack my suitcase as this would be our last full day in Chiesa, Italy before packing up to drive to Bellinzona, Switzerland.

This cute little hotel was run by friendly staff who greeted us before each meal. The staff laid out an elaborate continental breakfast: warm miniature croissants, small rolls of bread, both purple and black seeded grapes, nectarines, varying cuts of meat, and one of the largest collections of pre-packaged jelly and jam I had seen since coming to Europe.

At 8:15 AM, the group headed to their unassigned assigned seats in their respective van. Within less than five minutes of being in the car, Steffi had already begun to compensate for the lack of an AUX cord in the van. She coaxed Luke into playing one of his multi-language playlists. Before arriving at our second long hike of the trip we had already heard Italian, Spanish, and Hebrew music. When we had left the vehicles, Reto warned us that there would be a change in elevation over the course of the hike of one thousand meters. Today's hike would lead us to the Del Camerini Refuge on the top of the mountain.

After the first leg of the hike, we sat down for a quick break and we were passed by a group of four friends and their five dogs. During this break, we also happened to let a large group of children pass us. Within ten minutes of hiking after our break we had caught up to them and were caught behind them until our second stop. This stop though was not for a break like the one prior. We sat in an overgrown grassy area (where I worried about ticks the whole time) so that Christina could do her presentation on "exploring the Alps through paintings, literature, and music".

From her presentation, I learned that the Alps may have had one of the best PR teams of the time as it went from being perceived as a place of impending death to a place of many possibilities. The members of the PR team that went to bat for the Alps the most often were artists. It was through these artists that the general public came to learn about both the beauty and the freedom of the area. These artists were brilliant, they communicated (their usually positive feelings) through both literature and music. This transition circumvented the low literacy rate at the time as music was much more accessible to the general populous. I learned that not only did the Alps cause people to have strong feelings

of freedom, they inspired people to love, create freely, and escape their obligations. This spurt of inspiration allowed the Alps to become prevalent in the entertainment industry.

As we made our way up to the top, Reto quizzed us about a mountain in the distance. We determined it was a moraine from the 1850's because there was no vegetation present on it. We also were told that the area in which we were standing was from the last ice age because it had vegetation on its surface. Shortly after this quiz, we arrived at our next break destination — the place between Europe and Africa (before the land masses split of course). It was a cute meadowy area with a waterfall. Reto released us into the area in the name of observing the rocks around us for homework. I observed some hard rocks made of multiple minerals, some rocks with veins, light rocks towards the top of the waterfall, dark rocks towards the bottom of the waterfall, some basalt, granite, serpentinite, many igneous and oceanic rocks and rocks with a limestone cover. Reto informed us that this area should be of interest to us because we were able to see a fair amount of the Earth's mantle while still on the surface. We also learned that the white limestone that was visible had been deposited on the shelf of Africa many years ago.

Upon arrival at the top of our mountain, near Monte Disgrazia (3678m), we were greeted by a cute lodge with clean washrooms and a good kitchen. Many of my peers purchased pasta to eat here. I on the other hand had brought some bread and cheese that I scarfed down so that I could pet the five dogs that had lapped us in the first leg of our hike. Just before beginning our descent Reto shared that he had lived in this lodge while surveying the area. He promptly brought out a geological map that he was one of the authors of.

On the way down, we saw basalt that had undergone metamorphism, much more serpentinite, rubble indicating an ice fall, limestone and/or marble, bedrock, and the Earth's mantle separated from the crust by a fault. As a reward for our proficient hiking (and so Reto could visit his friend) we stopped at Hotel Chiareggio and had drinks. I had a lemon soda and everyone else had everything from alcoholic beverages to hot chocolate. We were given an hour to explore the area after our beverages were gone. Maddie and I explored the few shops and did a riverwalk in which she put her feet into the ice-cold water and I tried to skip some rocks on the water.

Upon our return to Hotel Chalet Rezia, we had a half hour period before dinner. This time I showered and then returned to the lobby for dinner. For dinner I was served a really tasty veal. By this time of the night, I was exhausted and I went to bed.



Fig 1. Some of the group hiking.

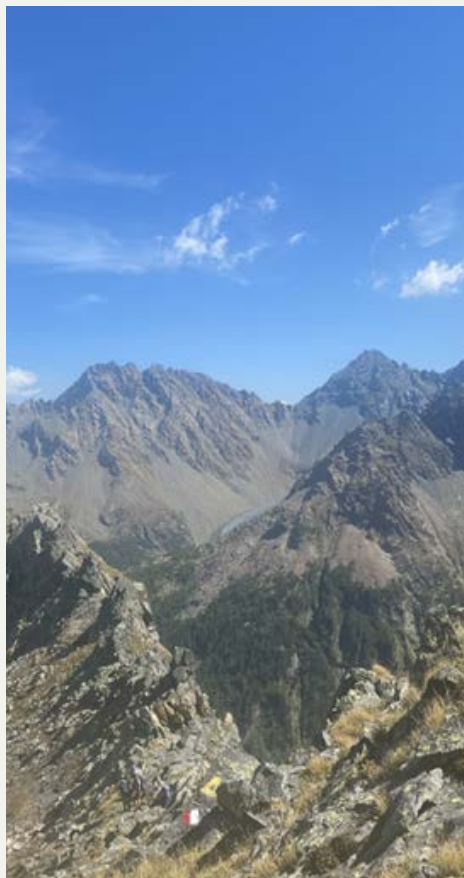


Fig 6. Visible serpentinite



Fig 2. An example of rock with a vein



Fig 3. Mountain Pasta.



Fig 7. The water



Fig 4. One of the 5 mountain dogs



Fig 8. Stonecrop and Bluebells



Fig 5. Part of the area's geological map.

AUGUST 25

MAGGIE ZHANG

This was the second last day of our journey. We left the hotel in Chiareggio at 9:45 in the morning and first drove to the site where Jacob had his presentation. Jacob presented his research about minerals — how they form and their relationship with the rocks. He taught us that minerals needed special conditions to form rock and were usually the mountain's treasure. Since they were valuable materials, mineral hunters, especially those crystal hunters, did not want to talk about their lives as the information about the location of minerals was secret. Besides, the hunters' jobs were dangerous, as almost every hunter knew someone who died on his job, but they genuinely occurred in the same family, being as the heritage of the secret treasure from nature. During construction projects, new minerals are mainly found by accident, but mineral hunters are skillful at finding a place to hunt.

Jacob's nice presentation was interrupted by construction multiple times, but he successfully taught all the research he had well prepared. After his presentation, Daniel asked him about his favorite crystal, which turned out to be aquamarine, a beautiful blue crystal that was only formed in the Alpine area. Reto complemented the presentation by informing us that about 5000 species of minerals exist in the Alpine regions. New crystals were found each year, but they were always kept as secrets for private profit. Reto recommended us to visit the mineral museum at Washington, DC to learn more about minerals.

Afterward, we stopped at a turn where people made roof shingles by slicing big rocks. In this outfield factory, workers always slice up the big chunks of stones by hand to minimize the waste of materials, and people sell these tiles to make money. This big industry was mainly famous for this valley, Chiesa, in Valmalenco, Italy. Reto's friend was not at his workshop when we visited, so we did not see the live actions of such a masterpiece; but those thin roof clips were laid near the gate, and we were amazed by the thinness of the rock.

The mineral journey continued by the next stop: Museo Mineralogico di Lanzada (Mineral Museum). Over 260 species of minerals have been recognized in this Alpine valley, and the Mineralogical Museum of Lanzada collected most of the minerals that could tell an aspect of the geological history of Valmalenco. We saw the aquamarine, pale-blue beryl mentioned by Jacob; demantoid, a type of rare green mineral (demantoid) yet highly concentrated in this valley; and magnetic crystals, which was another typical mineral that is ample in the valley.

Decades ago, people found a lot of green minerals without knowing their precious value as there was no usage for them. It was not until very late that people realized how rare those unique minerals were and started to buy them as an investment. For example, a few years ago, one green crystal was sold for 70,000 dollars.

Those green minerals were unique and rare in nature, but we luckily saw a lot in the museum collections. Besides, we learned about fibrous serpentine that was associated with demantoid. People used them to make gloves and clothing as they were soft and malleable. Stripping these serpentines with fibers, we could also use them to make paper.

Most of the collections in the museum were either gifted by villagers or bought/collected by the museum. However, a section in the museum mainly displayed quartz, a non-typical mineral from Lanzada. Quartz was varied in size, color, and shape, based on the condition of its formation, while in this valley, most quartz was covered by other minerals. This valley was almost the only place in the world where the quartz remained in its original shape though covered by minerals.

After visiting the mineral museum, we had a short break in a bakery where Reto and Steffi chatted with their friends, and then we headed to the church of the valley, Chiesa San Giovanni Battista. Outside the church, there was a record of how measurement methods changed historically, after Napoleon's arrival.

On the wall, two lines represent the measurement of one meter. The second line was the Italian way of measuring length: the length of arms. However, the various arm length of different people made it hard to have a standard for everyone. When Napoleon conquered the town, he set up the standard measurement of one meter historically, which was the line above. Entering the main gate, we observed granite floors from local regions and the gorgeous view of the Roman Catholic church. Coming out of the church, we had a short tour of the village where a jail and a bar existed in the same building. The town of Lanzada had tiny houses and narrow pathways, as the landscape outside of the town was too precious for agriculture. There are only 1300 citizens who still lived in the town, and the narrow pathways as puzzles made the house connect close to each other. Following Reto's friends, we drove to a surprise lunch where a local chef cooked us delicious manmade dishes: Pizzoccheri. Short tagliatelle cooked with greens and cubed potatoes: such a wonderful meal!

In the afternoon, we started a long journey to Bellinzona, with two stops at San Siro for 30 minutes of swimming and 30 minutes town walk at Menaggio. San Siro was located on the west shore of Lake Como, where we saw many people surfing and sailing on the way. Sitting in the van for two hours was hot, and we were excited for the wild swimming to cool down. Swimming gave us so much fun when there was a row of ducks swimming by us simultaneously, and I was surprised by how clean and fresh the water was in Lake Como. Besides, after swimming, we were dropped at Menaggio, the heart of Lake Como. Half of our groups were stopped by a nice Gelato store, and the other half, including me, walked around the town to explore different souvenir shops. I could feel the charm and relaxed vibe the town had, though we only had 30 minutes for the short break. I would definitely come back to visit the town in the future to fully immerse myself in the relaxing mode of life.

After spreading out, we finally met together, walked along the lakeside to the van, and drove to Bellinzona. There was a traffic jam on the way, so it was not until 8 pm when we arrived at the hotel. Steffi and Reto parked the vans while we walked around the hotel a little bit before the start of dinner. The restaurant in the hotel was famous for its pizza, and we each got an entire plate of pizza chosen by ourselves. It was my first time seeing a pizza topped with French fries ordered by Thomas. He was amazed too and shared his chips with us all. Usually, after dinner, it was the end of the day, but Reto brought us a super surprise afterward — the night tour of Castles of Bellinzona. There was a "secret" entry of the castle at night, with a long hallway connecting to the elevator to the top of the castle ground. We chilled and chatted at the edge of the stone wall and entered the castle through an open gate. The inside view of the castle was modern, different from the old pale view outside. I hypothesized that the town invested in reconstructions of the castle to welcome tourists to visit.

Walking out the gate to a side of the castle, Reto brought us the final surprise: a glass of GENEPI BERNINA, produced by infusing the Genepi plant that grows over 2000 meters on the stony ground and the moraines of the glaciers. It tasted juicy and sweet with a high concentration of alcohol, and I felt it enjoyable to try such a new taste bud shock in the Alps. We had friendly chats about the day's memory for about one hour and celebrated Reto's 25th birthday. The day ended by walking to the hotel at 0:00 am. Good Night!



Fig 1. Jacob's presentation at the serpentinite quarry.



Fig 2. Work site where people split the rock to make tiles.



Fig 3. An example of fibrous serpentinite that occurs together with demantoid.



Fig 4. Few typical minerals that are highlighted in the lecture.



Fig 5. The green crystal that is sold for \$70,000 in the auction.



Fig 6. The record of measurement outside of the church.



Fig 7. Inside view of the church



Fig 10&11. Wild swimming in Lake Como



Fig 8&9. Delicious surprise lunch.



Fig 12. Exploring town during the break



Fig 13. A fancy lavender shop in Menaggio.



Fig 14. Thomas ordered French chips pizza.



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Fig 15. Night view of the castle.



Fig 16. Steffi's daily sketch of the castle.



Fig 17. Cheer for Reto's 25th birthday!

AUGUST 26

JACOB KELLER

We start the day fairly late at around 8:00. We wake up in our rooms in the Albergo Croce Federale. Overall, it was a pretty good hotel with no elevators, unfortunately. However, that was made up for with the pizza in the attached restaurant. Even as I'm writing this, I still am thinking about that pizza. Luke and I wake up in our double, do our morning mitzvahs, and then head to breakfast. This honestly had to be one of the worst breakfasts we've ever had. Barely any part of the spread was palatable. At least they're good at pizza. Anyhow, we have some of the food and then check out and drop off our bags in an empty room on the second floor before we head out for the day. We start walking up to the second castle in town and pass by an interesting building with a bunch of busts. I take a pic.

It strikes me as strange that the entrance to a castle like this is hidden through such a narrow passage. It illustrates how they build wherever they can in Europe. Even though this can come at the expense of a certain maximalist aesthetic prevalent in America, I think it's kind of nice. Also, the original builders of the castle likely would enjoy the choke point. Also, I'm sure that they would also be happy that they have not constructed any escalators for easy access. I, however, am not so happy with this. As we walk up the stairs, Shalese remarks that the grass through the walls is ecobrutalist. I remark that I don't think she knows what that means. I take a pic to prove my point.

At this point, we all make our way up the long, arduous, torturous stairs to the castle. I wish there were an elevator like in last night's castle. At a certain point, I realized that it would be better to go up the hill instead of the stairs that ran around them. This leads me to a wonderful view of a field perfect for frolicking. What's more, there are no cows around that could use this grass.

First, he takes out the topographical map of the area, showing how far we've come from Chiesa Valmalenco and throughout the trip as a whole. Then he explains why the fortress itself has been built. It dates to the Neolithic age when the area was settled by the indigenous people of the area. Then the Romans built a fortress in the past to control that section of the mountains. Finally, Italian families from the Milano area settled and developed the three fortresses in the area to keep the wild "barbarians" at bay. Ultimately, this explains why the area is steeped in Italian despite being officially Swiss. Then Shalese starts her presentation: the last one of the program.

Shalese's presentation concerns the globe-threatening amount of solid waste that modern civilization goes through, in particular, America and Switzerland. America has a huge issue on its hands with waste due to the presence of a linear economy of waste. This means commodities are made, bought, used, and disposed of.

Often the disposal is in landfills that further threaten the environment and groundwater. In contrast, Europe has developed excellent methods of reuse and recycling that allow for a circular economy. What they can't reuse, they often incinerate in some of the most efficient and least harmful plants possible. Then during the Q&A, we have a lively discussion about the place of humanity on this Earth and the economic systems we choose to abide by. Once Shalese's presentation is done at around 10:30, we are free to explore the castle and Bellinzona until 1:30 pm.

I immediately go to the turret to take a picture because wow. Everyone else scatters to do the same. Finally, we all start to head back to the town after walking around the castle a couple of times, discussing light things like our place in the universe and idolatry while avoiding leaping lizards along the lane. I separated from everyone else due to needing to make it back to the hotel for the restroom because I wasn't going to pay a Franc just for that. That must be the top 10 worst things about Europe, ignoring the important stuff. Afterward, I go around the town a bit on my own looking through shops and trying to get some understanding of the average town goer. First, I stopped in the United Colors of Benneton due to a massive sale going on outside. After much digging, I find one decent shirt in my size. I think it's pretty cool but forgot to take a picture then so here's one after the fact.

Then, I went to the center of the town and was accosted by a charity worker for the World Wildlife Fund in front of this interesting statue called Divergence. Luckily/unluckily it was a non-starter because you would need a European bank account to give money. Nevertheless, I talked to her for a bit. She was very interested in eventually going to America and was very passionate about her job working for the charity.

Next, I went into a store called CSS that was right by the WWF booth. There was a sign saying "Health Bar" above the desk, signs saying various drinks, and a coffee machine so of course, I assumed I could order something. But apparently, it was just a bank. The workers had no answers for why it was styled like this but found the whole situation hilarious and even offered me coffee from their own machine. I graciously refused and moved on to try to find some coffee at a place that actually sells it. I eventually happened upon a cafeteria where I ordered a latte mocha for a whopping 5 francs. Nothing makes you miss Italy like Switzerland. I played my part as a tourist and sat by the window, and just people-watched for a while.

I then returned to the hotel to rest and get some work done. Then at 12:30 we packed up the car and were off for Zurich and our last drive. Daniel and Chase took the back with May third wheeling. Dina, Saige, and Nikki had the middle. Then in the best seats in the house, Thomas and I got to sit up front with Reto. I attempted to talk with Thomas for a bit, but he was asleep within 15 minutes. Everyone else was also very tired by this point so not much was said until we reached a rest stop.

There, I saw a pretty sick Eidelweiss hat but didn't get it. I kind of regret that now. If anyone reading this feels like getting it for me when they go my venmo is [REDACTED] so just request me.

Also at the rest stop, Dina and Thomas finally got their orange juice, and Luke, Saige, and some others cleared out the stop's chocolate supply. Then we were off once again. And once again Thomas fell asleep within 5 minutes.

Eventually, we make it to Zurich and make our way into the Hotel St. Joseph once again. After a bit of rest and a shower, we head out to a surprise location to finally meet Mrs. Giere! However, on the way, I turned my ankle once again on a curb, so I was in immense pain and kind of forgot to take pictures for the next part so my apologies. Anyway, I hobble, and everyone else walks over to what turns out to be Tibits, a vegetarian buffet place where they charge by the pound. At the entrance, we finally met her, and she was so wonderful. She knew all of our names, greeted us, and began to talk to each of us individually as dinner commenced. After speaking with her towards the beginning, I made my way over to the buffet and added bok choy, a vegetarian chicken patty, vegetarian chicken bites, couscous, and every other vegetarian goodness to my plate. I ended up scarfing this down, as did everyone after only having the bland breakfast that morning. Dessert was a very similar experience, but the place strangely had only vanilla sauce, chocolate sauce, tiramisu, and fruit.

After the usual two-hour-long European dinner, we started heading out to Hotel St. Josef but ran into the street parties that were happening all around Zurich. First, we pass a rave with a strong Eurodance bass-heavy beat coursing through the crowd dancing in front of a centuries-old chapel. I was feeling it, but everyone else kept moving on until we made it to a soul-based disco where the dancers and non-dancers decided to part ways. It was here that we had to say our tearful goodbyes to Mr. and Mrs. Giere. But then we got to party in the rain with Steffi! The songs were all very 80s American focused, switching from Heard it on the Grapevine to It's Raining to Play that Funky Music to Ed Sheeran for some reason. I was not feeling the Ed Sheeran. Daniel, Chase, Nikki, and May requested Mo Bamba but the DJ wasn't a chiller I guess. At some point, some very European teens or 20-somethings decided to join in with others and forced Luke and Chase to dance with them.

After a bit more dancing, people started to head back to the hotel at around 12:00 am. Knowing we likely wouldn't see each other in the morning, everyone said their goodbyes then. While it was sad that it ended slightly anticlimactic, it was nice knowing we'd all be able to ignore each other on Locust in just a couple of days. Not to mention that dancing in the rain would have been a nice ending for a 70s movie. So, I guess that's it, signing off for the Reto Fourteen 22.



Fig 1. A building in the town center showing off the Italian influence.



Fig 2&3. We make our way to the alley.



Fig 4. An example of the "ecobrutalism". I think things need to be brutalist before it can be eco.

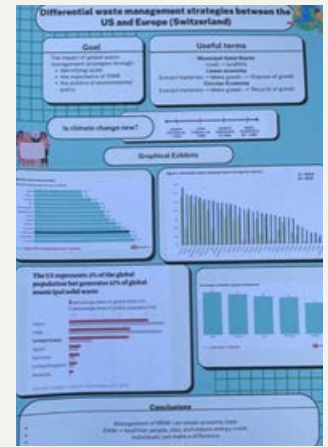


Fig 6&7. Reto and Shalese pre-presentation; Shalese's Page



Fig 5. Frolicking fields in the fortress.

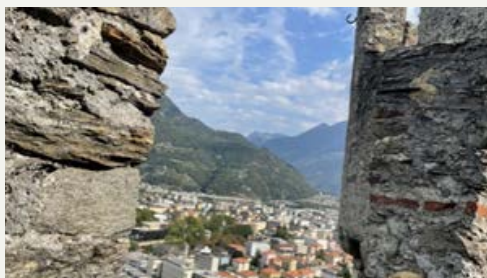


Fig 8. An outlook from the castle, invaluable in the olden days.



Fig 9&10&11. Maggie finds a perfect place to take insta pics. Daniel gets in position to get pictures afterwards; Pictures of me (left) and Daniel (right) courtesy of Maggie. Who did it better???



Fig 12. Saw this interesting contraption. I don't know what it does. Meant to ask Reto. I think it is to grind wheat maybe.



Fig 13. Eventually went down to this tiny room at the bottom of one of the turrets. Daniel hit his head pretty bad here so be careful if you go in it.



Fig 14. Some interesting graffiti as I started to head down.



Fig 15: The Shirt!



Fig 16&17. Sketch of divergence on the right. On the left is the CSS. If you look closely, you can see part of the sign that says Health Bar.



Fig 18. Latte Mocha and the window. Honestly should've gotten a cappuccino.



Fig 19. Thomas shlumped.



Fig 20. The hat in question.



Fig 21. Thomas taking a snoozer.



Fig 22. Chase and the Swiss boys.