



(A Local Group within the Geologists' Association)

Newsletter July 2000 ~~2003/2007~~ Vol.4 — No2.

About the time that a group of our members was observing, from an ideal position, a celestial phenomenon that had long been forecast and which arrived precisely when expected, on the other side of the world the redoubtable leader of our US trip, Ivan Dyreng was viewing a terrestrial occurrence that was as unwelcome as unexpected in his home town of Salt Lake City. We have to thank Lyn Linse, who is now happily in much better health, for passing on this letter from Ivan, and also the other letter which shows that, bless him, he is not letting the grass grow under his feet!

We are sad to report the death of Nita Lougher who passed away on Thursday 8th of June. We all knew her as a pleasant and sociable member of the Society and I am indebted to Cath Clemesha for the obituary that follows and also to her report on the Earth Alert which all of us found greatly enjoyable.

David Stephens has kindly provided a Brief Geology of Costa Rica and Margaret Burgoing a report on the Rock and Mineral Show at Kempton Park. Dr. Colin Dixon of Imperial College, London, who gave the lecture on the Iberian Pyrite Belt has kindly provided us with a précis, which will be in two parts, and a letter of thanks from Lyn.

And finally the answers to the Densa Quiz are:-

- | | |
|-------------------|------------------------|
| 1. Yes. | 7. Two. |
| 2. One. | 8. Ninety. |
| 3. Twelve. | 9. Nine. |
| 4. Ten. | 10. None. It was Noah. |
| 5. No. He's dead. | 11. The meat. |
| 6. Seventy. | 12. Twelve. |

David Caddy

Nita Lougher

Nita joined the Society in 1985. Her introduction to geology had been through classes at Farnborough Technical College.

She was a very keen and enthusiastic member of the Society and attended monthly meetings and field trips. She celebrated her 70th birthday at the top of Puy Mary in the Auvergne.

She passed on her enthusiasm for geology to a group of middle school children where she gave them masses of specimens to look at and learn about.

Through her work she had developed a special way of teaching children to read and for the last few years of her life she was trying to promote her ideas with Teachers Training Colleges and with a book she was writing on the subject.

Our sympathy goes to Edwin and her daughters.

Cath Clemesha

From: Ivan Dyreng
To: Farnham Geological Society
Date: 26 August 1999
Subject: Salt Lake City is Tornado Alley ? A Near Miss!!!

Dear Friends

Just a note to update you on what's been happening recently. Just two weeks ago, Elaine and I were having lunch in our condominium, looking out over Temple Square and downtown Salt Lake City, and the beautiful City Creek Park. We live just 2½ blocks ENE of Temple Square, overlooking the City Creek Park. We were watching the news, while watching the dark sky. We actually watched the tornado form. From our vantage point, looking over the rooftops of nearby homes and buildings, we noticed what appeared to be dark rain clouds seem to begin rotating slowly, near the ground in a counterclockwise direction, with no visible funnel connecting to the dark layer of clouds above, a short distance west of the Delta Center and the Wyndham Hotel (formerly the Doubletree Hotel, where some of you stayed). The swirling, dark, low mass, dissipated for a few seconds, then suddenly formed a funnel connecting with the dark clouds above.

We were awestruck with what we were seeing. Tornadoes don't happen in Utah! There were no tornado watches or advisories out. The darned thing sneaked in under the sophisticated doppler radar. We observed the tornado going over the Delta Center (home of the Utah Jazz), then over the Wyndham (Doubletree) Hotel, picking up roofing materials and huge sheets of canvas. The central funnel remained dark, but a transparent region with roofing, canvas, boxes, aluminium siding and rain gutters other debris circled the dark central core.

We watched as the tornado approached us and passed over the Family History (Genealogy) Center, and over the historic Mormon Tabernacle on Temple Square, and continued across North Temple Street and over the new Assembly Hall which is under construction. We saw the funnel pass over a giant crane (1½ blocks from our viewing perch). As the violent vortex passed over the crane, it was wrenching it in violent spasms. Suddenly the load arm of the crane fell to the roof of the new Assembly Hall, hanging by a cable from the top of the crane, like a giant arm of metal dangling from shoulder to elbow, and the forearm resting on the rooftop.

We were so riveted to the scene playing out below our balcony seats that we seemed more captivated by it, than we were fearful of it. The tornado had been approaching us almost directly, but began curving more to the North. It uprooted two trees directly below our condominium unit, and one directly across the street. The outer, transparent part of the funnel, passed within a stone's throw from where we were standing. We saw the flying debris up close! At this time we went for shelter in a small bathroom away from outside walls. As we stood in the dark, we could hear the winds rattling the ventilation pipes.

When the noise subsided, we emerged to survey the damage. The large, beautiful trees in the park below us were topped with huge limbs wrenched off the massive trunks. Virtually every tree was either uprooted or severely damaged. As the tornado continued in a northeasterly direction, it passed over Memory Grove (in City Creek Canyon East of the Capitol Building) and SE corner of the gardens of the State Capital Building, leaving devastation in its path.

It continued its swath of destruction through the "Avenues" area of the city, destroying many homes. Our home at 702 Hilltop Road, though undamaged, was in the neighbourhood where the greatest damage to homes took place. Those of you who watched interviews with victims, on the national news, were seeing many of my friends and neighbours. For my kids, the homes of Gloria Schow, Ray Gunn, Frances Pedersen and Grace Wilson lost their roofs, and the homes were severely damaged. Lou Whetman's roof was lifted up and dropped in place, but had to be rebuilt.

When the tornado passed over Temple Square, there was very minor damage. A large plate glass window was broken in the Visitor Center, but the Temple, Tabernacle and other buildings were virtually untouched! We are grateful to the Lord that we were untouched by this tornado that broke windows across a driveway in the neighbouring building.

I just got back from an Alaska Cruise on the new Sea Princess. A beautiful new ship that's larger than the Titanic. I had a great time. I saw 10 humpback whales, and caught a salmon with my bare hands (it wasn't dead, either).

Ivan (Dad)

From: Ivan Dyreng
To: John Linse
Date: 4 September 1999
Subject: Keep up the great recovery, Lyn!

Dear Lyn and John

It's great to hear that Lyn is recovering from her liver transplant. Keep up the good work.

I think often of the great friends we made and the good times we shared when the FGS came to Utah. I enjoyed the stimulation and challenge that came with leading your group. I have had many special groups on my tours. Some of my fondest memories are of the FGS group. I recall the bus tour, the American teachers and I were singing a new song for you to learn, "America", and your group drowned us out with your own words to "God Save the Queen". A special sentimental memory of your group was when you sang "Now is the Hour" as we were completing our journey. Say "hello" to our dear travelling companions from Elaine, my granddaughters Heather (now 12 years old) and Meggan (now 14).

Heather and Meggan are staying with us for the Labour Day weekend. We plan to take them to Snowbird Ski Resort today for the Oktoberfest. In July, Elaine and I took our 4 children and their families (22 people) to Disneyland, Sea World (San Diego), Legoland, and Universal Studios (near Hollywood).

I just returned from a 7-day Alaska cruise, two weeks ago today. I escorted a group of 33 people on a southbound from Anchorage to Vancouver, B.C. on the Sea Princess, the largest, newest and most luxurious ship in Alaska. I was a resource for our group to learn about glaciers and glaciation throughout the cruise, but was on deck to point out features at College Fjord and Glacier Bay. Our itinerary included the following: Anchorage - bus to Seward for embarkation (Cook Inlet and the port of Anchorage are too shallow for cruise ships, because the rock flour in the meltwater from the numerous glaciers has created deep, extensive deposits of glacial silt), Skagway, gateway to the Kondike Gold Rush of 1898, Juneau, the capital of Alaska, Ketchikan, and Vancouver.

Whilst I was in Juneau, I went whale watching from a small jet-boat. We saw a mother humpback whale with her calf, up close and personal. I saw a total of 10 humpbacks on the entire voyage. I saw a pod of 5 humpbacks in Glacier Bay. At first, I could just see that there were several whales spouting, but I couldn't really count them. Suddenly, I saw two tails in the air as two made a sounding dive. Seconds later, I saw three more tails as more whales dived. On the way back to our ship, we went to Mendenhall Glacier, and on the northern outskirts of Juneau, our driver stopped near a bridge over a wide creek. We went down to the water's edge, and found it choked with kokanee and pink salmon. The water was less than 10 inches deep, so choked with salmon, that it would be impossible to wade across without hitting or stepping on 3 or 4 salmon with each step. The kokanee were about 1 meter long and must have weighted 10-15 kilograms. The smaller, pink salmon, were only about 30 centimetres long. Being larger, the kokanee were toward the center of the creek in the deepest water, with their dorsal fins and backs exposed. Dead kokanee littered the banks of the stream. Since I didn't want to get my shoes wet, I didn't go out to the middle to catch a large fish. I simply stooped down and caught a smaller pink salmon by the caudal peduncle (tail). Those Alaskan bears have nothing on me!

The Farnham Geological Society has my permission and blessing to publish my tornado stories, and anything in this letter. I still wear my FGS "T" shirt regularly.

Love, Ivan

Earth Alert, Brighton. 26th-30th May 2000

We had a grand turnout for the GA Reunion/Earth Alert conference in Brighton over the May Bank Holiday weekend. I counted 38 members. 20 of us stayed in two hotels near the Brighton Centre (organised by Dorcas), some came for the day and some came on their own or with other groups.

There was plenty to do in and around the conference and in Brighton. The weather was much better than expected, with Monday being warm and sunny. There were mineral dealers, book sellers, trade stands, poster competitions for young people and undergraduates and a Discovery room with hands-on activities for children.

Most members attended some or all of the three-day lecture programme, some helped to man our display at the GA Reunion and others went on the organized walks round Brighton and to places of geological interest. Some did all three.

Our display celebrated 30 years of the Society with photos of trips at 5-year intervals, a map of our 1996 trip to America, a map of our UK field trips, our ichthyosaur tail found by a group of us near Whitby in 1987, Lyn's magnificent fossil fish from Fossil Butte in Wyoming and fossils from Lacustrine sediments from the Auvergne and Sothofen.

I hope that everyone who went to Brighton enjoyed the meeting and that next time the Reunion is within reasonable travelling distance they will want to go again. I believe it will be in Liverpool in 2001.

Cath Clemesha

Brief Geology of Costa Rica

Costa Rica lies between Nicaragua in the NW and Panama in the SE. It is the size of Wales and has three regions geographically. Firstly there is a Pacific Coastal section, mostly relatively dry lowlands around the Gulf of Nicoya, except for the Northern Peninsula which rises to 3,000'. Secondly there is the highland backbone running NW-SE with peaks rising to 12,000' in the south, but 5,000' in the north. Thirdly there is the Caribbean lowlands, which are swampy, especially near the coast.

Most of Costa Rica is less than 3 million years old, except for the Nicoya Peninsula in the NW. The Cocos Plate moves NE at 10cm/year and is being subducted under the Caribbean Plate, which is being uplifted to form the central mountain chain. This ridge generally consists of volcanic materials, except in the SE where the Cordillera de Talamanca is formed of intruded igneous rocks, such as granite.

Most of the population live in a plateau at 3,700' elevation, which is fertile because of an abundance of volcanic ash. The capital of San José lies in the area between volcanic peaks. We visited Volcán Poas (9,120') which is quiescent, but saw little of it being in cloud. Volcán Irazú (13,320') to the east of San José erupted in 1963, on the day when President Kennedy was on a State Visit to Costa Rica. Fumaroles are the only activity at the moment.

We also visited the area of Volcán Arenal (5,400'), 50 miles NW of San José. This volcano erupts every 15 minutes or so, discharging a red-hot lava flow. We enjoyed a swim in the thermal baths below Volcán Arenal supplied by hot water springs.

These impressions of the geology of Costa Rica were gained in a tourist visit in February 2000 which included birdwatching. We saw resplendent quetzals in the Monteverde Cloud Forest after negotiating several long suspension bridges above the forest canopy.

THE IBERIAN PYRITE BELT

The so-called Iberian Pyrite Belt is in a zone of Late Palaeozoic rocks, 250 km long and about 50km wide in the Spanish Province of Huelva and the southern part of the Portuguese Province of Alentejo (see map). It is called the 'Pyrite Belt' because it yielded large amounts of pyrite from the latter part of the Nineteenth Century and well into this Century, for the manufacture sulphuric acid and other sulphur chemicals for the industries of western Europe. But the 'Belt' has also yielded important quantities of silver, gold, copper and tin with a little manganese

HISTORY

Mineral working in the Iberian Pyrite Belt is of great antiquity. There are several Bronze Age sites which have been excavated, and there are several references in the Old Testament to a place called Thasis (the spelling varies in English translations) which many biblical scholars have agreed is the mining district now known as Rio Tinto. *"For the coastlands shall wait for me, the ships of Tharshish first bring your sons from far, their silver and gold with them"* (Isaiah LX,9 King James I, authorised version), seems to imply that migrant Israelites were working in what was then part of the Carthaginian empire possibly about 1200BC. Pliny the Younger, records the area as a silver producer in the Second and Third Centuries AD and there are a number of extensive Roman sites in the Belt which include some sophisticated mining technology for the time. At Rio Tinto alone, the Romans left behind four million tonnes of smelter slag and mine waste.

Little is recorded of mining activity during the Moorish occupation and it was not until the Seventeenth Century that French and British explorers began to realise the mineral potential of the Belt. At first the interest was in silver and gold (as in Roman times) but significant amounts of copper were found with smaller amounts of zinc and lead. The industrialization of western Europe saw the growth of demand for sulphur chemicals, especially sulphuric acid. These were traditionally produced from the mineral pyrite and large quantities of the mineral were known to be available in the Belt. Dozens of mines were opened up and an extensive network of narrow-gauge railways constructed to take the pyrite to Atlantic ports. Where the copper content of the ores was high, this was recovered locally by an early form of heap-leaching, or by chemical treatment of the iron oxide cinders at the sulphuric acid plants in the industrial heartlands of Europe.

At the beginning of the Twentieth Century, large deposits of elemental sulphur were discovered around the Gulf of Mexico and a process of extraction perfected. This sulphur was purer and easier to transport and use than pyrite but the pyrite industry continued for decades. For the deposits in the Belt, the political upheavals of the Spanish Civil War and the Second World War caused a great reduction in the industry (although it continues today in a small way). From the end of the wars, there was renewed interest in the mining of copper and other metals and discoveries were made. Several new mines were opened up including an open-pit operation at Rio Tinto for silver, gold and copper. The most spectacular discovery came in 1977, at Neves Corvo in Portugal. This deposit, 300m and more below surface, contains over 100 Mt

of massive sulphides part of which can be mined with a content of 10% copper and 2% tin and also contains considerable resources of zinc and silver.

GEOLOGY

The pyritic deposits of the Iberian Belt are associated with what is locally known as the "*Complejo Volcano Sedimentario (CVS)*" a series volcanic and sedimentary rocks. The CVS has not been dated directly but its age is constrained by fossiliferous horizons above and below, from Famennian (Upper Devonian) to Upper Visean (Lower Carboniferous), a period of about 20 Ma, so it is possible that it is diachronous. In places there is a single CVS horizon. In others, there are two or three in the sequence which may be due to repeated vulcanism or repetition by later thrusting. The typical CVS sequence consists of a lower mafic volcanic unit and an upper felsic unit dominated by volcanoclastic rocks. Sediments are present in the sequence, largely of volcanic provenance. In the volcanic rocks there is a confusing mixture of sub-marine and sub-aerial textures. The contact between the CVS and the overlying rocks is marked by a persistent horizon of cherts (some contain radiolaria), jaspers and siliceous manganese rich rocks.

Below the CVS is a sequence of fine grained sediments containing an abundance of altered mafic sills and dikes with rare calcareous horizons which have yielded Famennian conodonts. Above the CVS is a thick sequence of siliciclastic rocks, including black shales, graywackies, and turbidites, very similar to the Culm facies of the Carboniferous of North Cornwall and Devon and are usually known by that name. Fossils are rare but at the base of the Culm are found marine bivalves and plant fragments of mid to upper Visean age.

In the east of the Belt, and to the north, are a number of intrusives of granodiorite which have been shown to be geochemically similar to the felsic lavas of the CVS and there are hybrid rocks indicating the coexistence of felsic and mafic magmas.

The whole Devono-Carboniferous sequence is folded and it is generally concluded that this was during the Variscan tectonic event (late Carboniferous to Permian). In the east, open folds dominate, but further west, low-angle thrusts are more common. There are many faults in the area which are clearly later than the Variscan tectonic period. These become more numerous in the west of the Belt. These may be a result of the tensional tectonic event associated with the opening of the Atlantic Ocean in the Cretaceous.

It is clear that the area was eroded and weathered during the Tertiary and there are signs that a peneplane developed, seen today as a series of flat topped hills capped by conglomerates, sands and clays that contain Pliocene bivalves. Since the Pliocene there is strong evidence of uplift and erosion. The river valleys in the Spanish sector show deeply encised meanders and a hilly topography. To the west, in Portugal, the topography is of gently rolling hills.

ROCK AND MINERAL SHOW

When is a mineral show a field trip? When you meet up with people you haven't seen for years, try desperately to put names to faces and try to remember where you saw each other last. So was the occasion at Kempton Park Rock and Mineral Show held in April. Originally it didn't sound too exciting but when amateur geologists get together you can't help but discuss, describe and question the authenticity of specimens on show. As usual one realises a lack of knowledge. Next time I'll have my mineral book with me or chemistry notes! Oh well, it really was fun and a lovely day out.

TO MY FRIENDS OF THE FARNHAM GEOLOGICAL SOCIETY

A Message from Lyn.

Thank you one and all for the get well cards, phone calls and kind thoughts which I received during my recent stay in hospital and convalescence. You have given me the spirit to get well as fast as possible so I can return to being an ACTIVE member. Especially appreciated were the cards and phone calls from you happy travellers on the Eclipse 99 trip and the Lakes field trip.

Love from Lyn Linse, your former Programme secretary.

