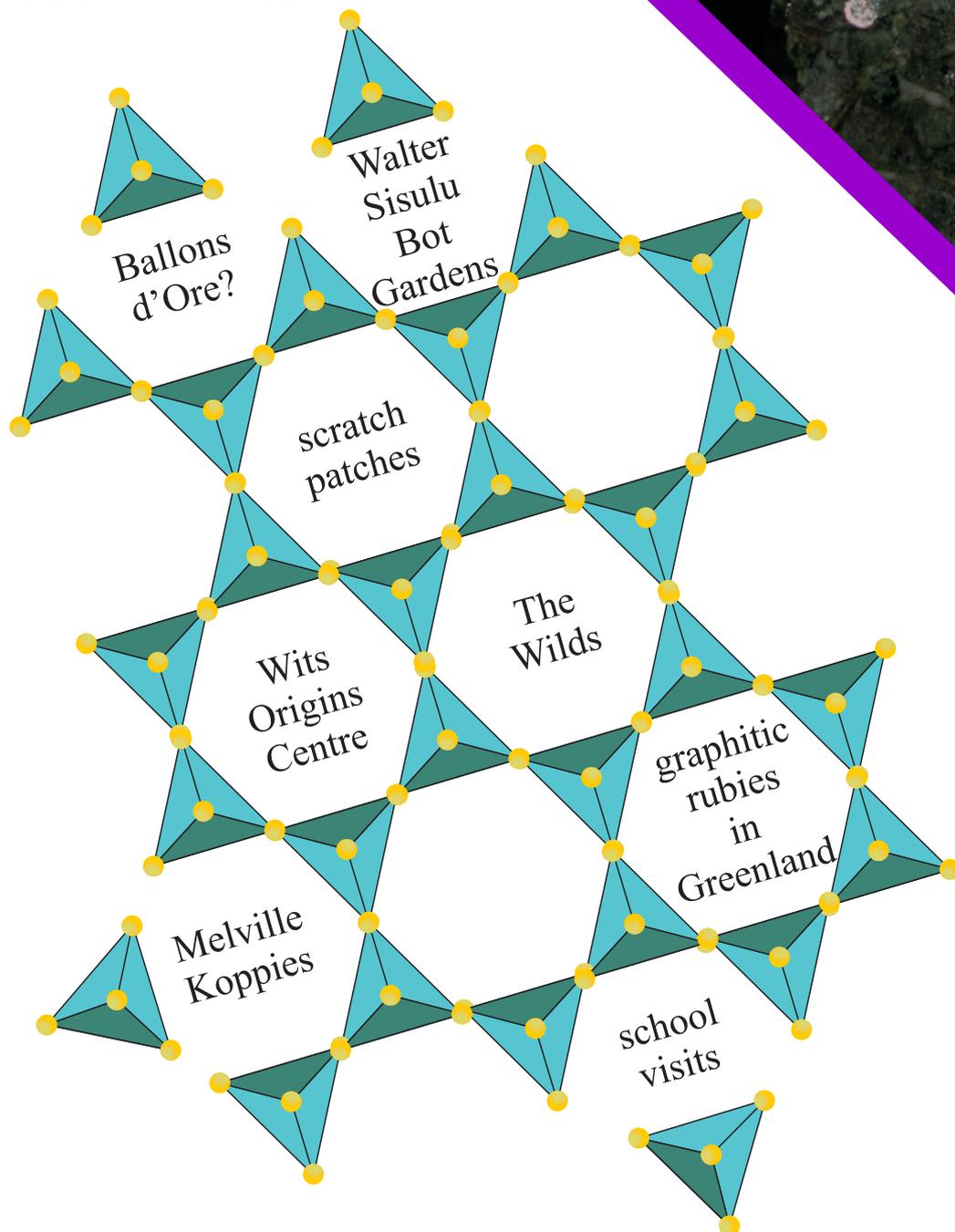


# the Geode the Geode



Family-friendly  
geoscience  
destinations in  
South Africa



## The GEODE

Minsa  
Newsletter  
Volume 8  
No. 4  
December  
2021



website: [www.gssa.org.za/Minsa](http://www.gssa.org.za/Minsa)  
e-mail: [Minsa@gssa.org.za](mailto:Minsa@gssa.org.za)

# the Geode the Geode

NEWSLETTER

Volume 8 No. 4

December 2021

## Arriving at your in-box, omicron-free

<b>Contents</b>	<i>p.</i>
Editor's Site	1
Message from the Chair	2
Forthcoming Events	2
<b>Minsa Affairs</b>	
Mineral Symposium postponement	3
<b>Articles</b>	
<b>Issue theme: Family-friendly geoscience</b>	<b>3</b>
• Scratch Patches – Cape Town: <i>Lesley Andrews</i>	3
• Exploring the Eastern Cape, family-style: <i>Steve Prevec</i>	6
• The Waldorf School, Pretoria: <i>Igor Željko Tonžetić</i>	12
• The Wilds of Joburg: <i>Razina Mayet</i>	13
• Melville Koppies: <i>Musaratt Safi</i>	14
• The Wits Origins Centre: <i>Tammy Hodgskiss</i>	15
• Walter Sisulu Botanical Gardens: <i>Bertus Smith</i>	17
<b>Other Gems</b>	<b>19</b>
• Gems & fossils: Rubies from Greenland.	19
• Why do Lionel Messi and Cristiano Ronaldo possess pyritic Au-Cu-Zn-Fe ore deposits?	21
• Bruce's Beauties: Bruce comes for a visit.	24
• A December crossword, & the September solutions	25 26

**Next issue theme:**

***New takes on old analytical tools  
(see pg. 20)***

### The Editor's Site

Welcome to the final issue of the Minsa Geode for 2021. In this issue, we feature family-friendly geoscience activities, ranging from hands-on rock and mineral activities in Cape Town and Johannesburg, to sites for family outings in the Eastern Cape and Johannesburg, to museums. Even school visits get a look in, although we very strongly recommend that you organise this with an actual teacher (as is the case in our article), and not just turn up at a school with a sack ("It's alright, everyone, I'm a geologist"), which will get you escorted off of the premises, and possibly a restraining order. The Origins Centre at Wits and the Walter Sisulu botanical gardens in northwestern greater Johannesburg are also featured.



*The Editor, in the Karoo.  
Late mid-life crisis,  
anyone?*

The list of potential geotourist activities around the country is too exhaustive to attempt, and some very high profile ones have been neglected here, including

the Heritage Trail behind the town of Barberton which any geologist visiting that area must experience, and the educational hiking trail through the Tswaing Crater, within easy reach of Pretoria and Johannesburg. In addition, many game parks and guest farms now offer geotourism as an attraction, which we (speaking on behalf of the geoscience community) are all for, but care must be taken inasmuch as the attitude towards heritage management may be under-informed. Fossil collection is not permitted at any site, no matter how common the fossils appear to be, except by permit-bearing members of the scientific community; want to bash off a chunk of granite or dolerite? Be our guest! But fossils are off limits.

We also feature a few other gems, including reports on new discoveries of rubies in Greenland, and whether or not Lionel Messi can spare a trophy for provenancing studies. The Editor also shares a visit from Prof. Bruce Cairncross, in lieu of a new mineral photo feature, and whips up a new crossword, as well as sharing the solutions from the last one.

And that's the perspective from the Editor's site.

*Steve Prevec*

**From the Chair**

And so, the year of 2021 has come to an end! I write this column to you as we are once again, unfortunately, entering another wave and another uncertain period of the global Covid-19 pandemic. Let us all hope that 2022 will bring with it more clarity and a better way forward!

I am very excited about the December 2021 issue of the Geode, which has the theme of "Family-friendly geoscience". The contributions are aimed at giving more information on geoscience-themed sites and activities that the whole family can take part in, specially for the holiday season. A variety of authors contributed on a variety of topics, that include activities and sites in Gauteng, the Eastern Cape and the Western Cape. I hope it will also act as a reminder

of all the interesting and beautiful things sitting at our own doorsteps, especially while the rest of the world seems so closed down and far away.

With regards to Minsa activities, two of them were able to go forward recently with great success. A visit to Palabora Mine on 6 October 2021, which was done in conjunction with the South African Micromount Society, lead to the collection of some great samples for the Minsa members who attended. Night at the Museum also took place at the Ditsong Museum on 26 November 2021, and attendance numbers reached pre-pandemic levels! I would like to thank Igor Tonžetić for helping to organize these fantastic activities. For 2022, our management and co-opted committees are hard at work at identifying topics and speakers for public lectures, so expect some exciting announcements soon. We are also looking into hosting hybrid events, where possible, so that people can attend both in person and virtually. Some site visits that had to be postponed due to the pandemic should also be happening within the first half of 2022, so be on the lookout for them once the dust clears and dates are fixed.

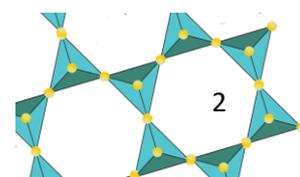


Bertus Smith  
Chair, 2021-22  
Minsa Executive  
Committee.

*Insert your own  
caption here.  
"Sweet  
Caroline..."*

To conclude, I would like to thank Steve Prevec, who edits the Geode, as well as everyone who contributed towards this issue of the Geode. Also, thanks to all of you who are reading and enjoying the Geode! Please be safe, whether you are travelling or staying home for this holiday season, and happy holidays!

Kind regards,  
Bertus Smith



### Forthcoming Events & Attractions

*These events are still missing dates, as a consequence of lockdown logistics: Minsa will let you know! Watch for e-mailed announcements.*

- Tile Factory Visit (TBD)
- Wirsam Visit (TBD)
- BTG Talk (August 2022)
- R512 Dolomite Pub Crawl (Late 2022 - Lesedi Cultural Village, Lazy Lizard Brewhouse, L'Atmosphere Bistro, Nikita Restaurant Motel, Blue Night Revue Bar, Gem of the Bushveld Sportsbar)

### Minsa Affairs

#### 5<sup>TH</sup> SOUTHERN AFRICAN MINERAL SYMPOSIUM 2021

#### SECOND CIRCULAR

A one-day symposium highlighting minerals and mineral and gemstone deposits of southern Africa, hosted jointly by the Mineralogical Association of South Africa, University of the Witwatersrand, Johannesburg and the Southern African Geomount Society.



#### Important Information

Date: Saturday 20<sup>th</sup> November 2021  
 Venue: University of the Witwatersrand, Johannesburg  
 Cost: R175.00 (attendees); R100 (presenters) – Reduced from 1<sup>st</sup> Call (includes tea/coffee & packed lunch)  
 Enquiries: Symposium Chairman – Igor Željko Tonžetić: [minsas@gsa.org.za](mailto:minsas@gsa.org.za)

Please note that the 5<sup>th</sup> Annual Southern African Mineral Symposium, originally scheduled for Saturday 20 November 2021, has been postponed for a year (‘til Nov. 2022). For more information, please contact Igor Tonžetić at the Minsa address provided.

### Articles

#### December issue theme: Family-friendly geoscience destinations.

*The theme invited thoughts on where you can take your family and friends, or a class of school children, to interest them in the marvels of the natural world, specifically rocks and minerals? From mineral collections at museums to stunning views of incised landscapes, where are the destinations that turn your crank, geologically-speaking, and why? We feature eight submissions on a wide range of possible geo-awareness-raising destinations, presented, helpfully, more or less in order from west to east.*

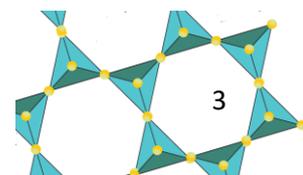
- Scratch Patches – Cape Town (Lesley Andrews)
- Eastern Cape Geotourism (Steve Prevec)
- Igor goes to school: Geoscientist visits the Waldorf School, Pretoria (Igor Željko Tonžetić)
- The Wilds of Joburg (Razina Mayet)
- Melville Koppies (Musaratt Safi)
- The Wits Origins Centre (Tammy Reynard)
- Walter Sisulu Gardens (Bertus Smith)

#### Scratch Patches or If There’s An Itch – Scratch It!

##### Lesley Andrews

We all love scratch patches – those areas of polished stones or crystals where we can scratch around and collect our favourites. They are a modern version of the pretty pebbles we picked up on the beach, or the crystals searched for near old mines, in our childhood days. Most youngsters nowadays are also unable to resist scratch patches; allowing them to scratch is one way of encouraging an early interest in mineralogy.

This article describes selected scratch patches in the Cape Town area. We can only “scratch the surface” as there are many scratch patches all over South Africa, usually hosted by museums, mineral traders or mineral clubs.



**Cape Town area Scratch Patches**

Scratch patches come in many shapes and sizes, from relatively large outdoor areas, down to small “treasure chests” or boxes inside mineral shops.



*A large outdoor scratch patch at Mineral World in Simonstown.*

The contents of the scratch patches are usually polished or tumbled semi-precious gemstones, but sometimes crystals or lapidary offcuts may be used. The stones may be of African origin or be from overseas.



*A “mini” scratch patch inside the Creative Cube at Table Bay Mall.*

Occasionally a mixture of stones and bags of stones with child-appeal are offered. Stone sizes in larger outdoor patches may be up to 20 mm, but in the mini or micro scratch patches, these are usually less than 10 mm. In Cape Town such small sizes are popular with tourists and visitors who do not wish to carry heavy weights on their journey.



*Large tumbles in the scratch patch at Mineral World in Simonstown.*



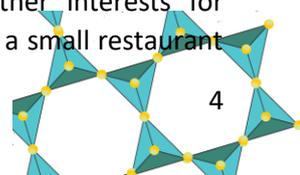
*A treasure chest with child-appeal found at African Gems and Minerals, Montague Gardens branch.*

Two well-known mineral suppliers are described below.

**Mineral World**

Mineral World (formerly Topstones) run a gemstone-producing factory in Simonstown and were probably the first scratch patch developers in South Africa. Around forty years ago, the factory area was expanded to occupy the old gravel parking area. Since many visitors had been noticed hunting in the gravel for chips of stone, the owners had the idea of constructing an outdoor scratch patch and filling it with some of their tumbled products. Visitors could then select their own gemstones and pay for them by volume – this is the system used by most scratch patch owners in the mineral trade.

Apart from the scratch patch, other interests for youngsters include “Cave Golf” and a small restaurant



with a tuck shop. Older children may join tours which show the working tumbling mills and demonstrations of stone sorting (by prior arrangement). A walk-through UV mineral display can also be investigated.



*Spectacular geodes and mineral lights on display at Mineral World.*

There are mineral and gem shops on the premises with fascinating displays of minerals and jewellery as well as rough lapidary material. This may interest older children and, especially, their parents! A micro scratch patch or treasure chest is available to visitors indoors.

Mineral World also run a scratch patch on Dock Road at the Victoria & Alfred Waterfront. There is a mineral shop on site but it is smaller than the shop in Simonstown.

### ***African Gems and Minerals***



*The outdoor scratch patch at African Gem and Minerals in Greenmarket Square. Photo supplied by Sudden Kampango.*

Rob Smith operates two mineral stores in Cape Town, and both contain a scratch patch. The larger, outdoor

patch is in the CBD, in Greenmarket Square, and the smaller "treasure chest" is to be found inside the shop in Montague Gardens.

Both sites boast mineral shops, where books and educational material for children are on sale.



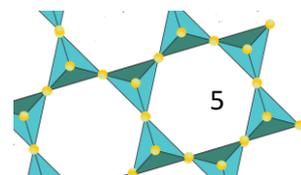
*A selection of minerals on display at African Gem and Minerals, Montague Gardens. See their advert in this issue for further information.*

### **Scratch Patch learning and motivation opportunities**

When children visit a scratch patch, they usually enjoy collecting pretty stones (and, as an adult mineralogist, you will find the stones they favour differ surprisingly from your own choice), but the experience should not end there. Usually there is an identification chart near to the scratching area and children should be encouraged to match up their stones and put a name to them. Who is going to encourage them – well, you are, as a Minsa member! Most scratch patches will not admit unaccompanied children, so you need to stick around anyway. You should not abandon your pupil, even if you are busy scratching up your own bagful of treasures.

### **Your local Mineral Club**

If you feel your child is interested in minerals and crystals, you can take things further. On the first Saturday of every month the Cape Town Gem and Mineral Club in Bothasig holds an Open Day. Entrance is free to the public, who can visit the traders' tables, look at cabinet displays and purchase snacks when lockdown allows. Children are welcome and they can join a small group to learn a little more about minerals and (important for motivation) do a little project work and make a small lapidary item which they can take home.





Examples of items which can be made and taken home: beading (rose quartz and hematite) and a quartz crystal pendant. Photos by Claire Vaskys.



The secret mineral colours revealed by UV light in the dark room. Photo by Claire Vaskys.

The youngsters are each given a labelled chart and they can visit the club scratch patch to find minerals and glue them into the correct place (with help from the

children's liaison members). There are spaces for extra stones that appeal to the individual. After this the group will get down to making something to take home, using lapidary items, such as jewellery, crystal-topped pens or gifts for Mum or Dad. There is a dark room for the examination of UV-fluorescing minerals, and a strictly-supervised lapidary workshop tour for those who are interested.

The hope is, of course, that the children will take an interest in mineralogy and bring their friends to the next Open Day. The Gem and Mineral Club also offers school outreach classes to older children when approached by school teaching staff, but these are during school hours.

#### Acknowledgements and further information

The following people provided helpful information and photographs for this article (in order of appearance in the article):

Bruce Baines and Athena Paxton of **Mineral World**

Website: [www.scratchpatch.co.za](http://www.scratchpatch.co.za)

e-mail: [tumbled@topstones.co.za](mailto:tumbled@topstones.co.za)

Llyris Berry of **Sabella Crystals & Treasures** (Table Bay Mall)

e-mail: [llyris.uk@gmail.com](mailto:llyris.uk@gmail.com)

Rob Smith, Sudden Kampango and Mark Collins of **African Gems and Minerals**.

Website: [www.AfricanGems.com](http://www.AfricanGems.com)

e-mail: [mark@africangems.com](mailto:mark@africangems.com)

Jo Wicht, Claire Vaskys, Tracey Hannath and Rinda du Toit of the **Cape Town Gem and Mineral Club**

Website: [www.ctminsoc.org.za](http://www.ctminsoc.org.za)

Photographs were taken by Lesley Andrews unless marked otherwise.

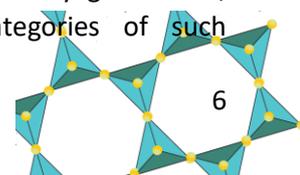
### Eastern Cape Geotourism: Family-friendly geoscience in the land of Mandela

**Steve Prevec**

**Dept of Geology, Rhodes University**

**Makhanda, RSA**

On the chosen theme of family-friendly geoscience, one can identify two main categories of such



destinations. These can be places where the picturesque geology provides the setting for family-accessible visiting, or they can be places where there is actually a genuine built-in geoscience education component, beyond that which you bring with you. Or they can be both, in theory.

### Geologically-hosted activities

South Africa is full of the former type, where the geology provides the visually stunning, and geologically stimulating, setting for a picnic, a braai, or a little walk. Some examples from our neck of the woods include Addo Elephant (National) Park, which includes the usual assortment of African animals to gawk at, as well as campsites and chalets to stay at, but also some impressive examples of what happens to the Cape Supergroup when it gets stuck between two continental plates. The particular site shown here is at a location where one can get out and walk the trails without the risk of passing through the digestive system of a lion, as would be the case in the main park.



*Vertically tilted sedimentary rocks of the Cape Fold Belt at Addo Elephant Park.*

Continuing further to the west, in the westernmost Eastern Cape, one encounters the Storms River (Stormsrivier) Gorge, and associated suspension bridge, from which this photo of the gorge was taken, looking south towards the sea (technically, the Indian Ocean). The contrast between the vertical jointing and the horizontal layering provides the access route for the river (not visible here).



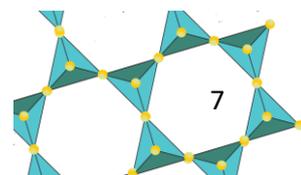
*The Storms River Gorge, Tsitsikamma Nature Reserve.*

This area is associated with the Tsitsikamma forest and mountains, and National Park, at which the folded Cape Supergroup rocks of the Cape Fold Belt provide a spectacular backdrop for the beaches and hiking trails.



*Footbridges straddling the shoreline at Tsitsikamma.*

Moving on to recreational geology, options include flinging oneself headlong off of the bridges into the coastal gorges, ideally while firmly attached to a bungee cord (sorry, no photo), or paragliding off the Permian crags of the Valley of Desolation overlooking Graaf Reinet in the Eastern Cape.



**ROB SMITH**  
**AFRICAN GEMS AND MINERALS**  
Est 1984

**CAPE TOWN**  
[www.AfricanGems.com](http://www.AfricanGems.com)  
+27 (0) 76 665 1711

MINSA

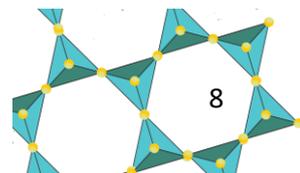
Got a service  
you want us to  
know about?

**2022 Minsa  
Geode  
Advertising  
Rates**

$\frac{1}{8}$  page = R120  
 $\frac{1}{4}$  page = R290  
 $\frac{1}{2}$  page = R575  
Full page =  
R1150

20% discount  
for 4 issues (a  
year) in advance

MINSA



We are perhaps starting to push the limits of the definition of family-friendly by now, unless you count the family waving goodbye to (or shoving off) the parent in question, and then later participating in the search for debris.



*The view from the heights of the Camdeboo National Park, overlooking Graaf Reinet. Hang-glider not shown.*

For a more sedate pace, but still facilitating some adrenaline production, rock climbing up the Cape Supergroup offers geology-based entertainment that can be enjoyed by participants of all ages.



*Rock-climbing 101, a few kilometres outside of Makhanda (Grahamstown).*

Even just the beach, here featuring angular unconformities in Palaeogene dunes near Port Alfred, Eastern Cape, provides plenty of opportunity to interact with interesting geology.



*The beach: angular unconformity at Port Alfred beach confounds dog, who struggles with the concept of Deep Time.*

**Natural History Museums**

Finally, we come to the genuinely educational opportunities, such as is provided by museums. In the Eastern Cape, the *Paranthodon* (a South African stegosaurid) rules, seen here as a reconstruction in the Palaeontology Gallery at the Albany Museum in Makhanda, and also found at Bayworld, the natural history museum / mini-zoo in Gqeberha (yes, say it with me, out loud...). At the Museum, guided tours can be arranged which include the fossil prep lab, as well as the natural history of the Eastern Cape.



*Undersupervised children at the Albany Museum, Makhanda, posing with a Paranthodon.*



*Sometimes-animatronic dinosaurs at Bayworld; here, two Coelophysis' live dangerously below the thagomizer of another Paranthodon (they are common 'round these parts).*

The Kitching Fossil Centre in New Bethesda, nestled amongst the Jurassic doleritic peaks of the Eastern Cape's Palaeozoic stratigraphy, offers further opportunity to learn about Gondwana and South Africa's fossil heritage, including how fossils are recognized, extracted from the rocks, and prepared for display and study.



*Students receiving training in the recognition and conservation and interpretation of mammal-like reptiles (pre-dinosaur) from a guide at the Kitching Fossil Centre, New Bethesda.*

**Game Park geotourism**

Increasingly, private ventures such as game parks are looking at developing and marketing their natural and cultural heritage as a supplementary revenue stream, and (almost always) because they are also actually

interested in it. This often takes the form of small private collections of fossil plants and animals, arrowheads and tools, and awareness of rock paintings in sheltered (hence preserved) areas on the farms.



*Geology students lunching amongst the Permian herbivores (Aulacephalodon, at left) and carnivores (Gorgonopsian, at right), outside the Kitching Fossil Centre. Creature construction by John Hepple (Rhodes Geology) and exterior artwork by (Dr) Rose Prevec (Albany Museum).*

This is quite tricky in terms of formal recognition; our fossil heritage is just that, part of our national natural heritage, and fossils of any kind must not be tampered with or collected without a specific permit, which is provided only to researchers based typically at museums and university departments. However, a blind eye tends to be turned to historical collecting by the farmer, as the alternative would probably have been the loss or destruction of the artifact, plus they can usually tell you where it was found, and a lot of this collecting may have happened decades ago prior to awareness of, if not the development of, relevant legislation. If you spot something interesting, take a photo and send it to your local palaeontologist! Better to have your name on a plaque in a museum than on a police summons.

Having said all that, there are farms who have a long history of working with formally-permitted and approved researchers, and a good awareness of the significance (or insignificance, as the case may be) and management of their fossil resources, and are well-networked with the research community. One such example is at Ganora Guest Farm, near New Bethesda.



*J.P. Steynberg demonstrates the recognition and conservation of fossil dicynodonts on Ganora Farm.*

The farm owners contribute a member of the management board of the nearby Kitching Fossil Centre, and maintain a fossil museum on the farm, as well as a modern plant and animal museum, for when the Zoology students visit. Visitors can also experience an educational walking trail that includes conserved fossils in the field.



*Here, Geology students get a chance to practice the art of non-destructive fossil excavation. The fossils are protected from erosion and damage by being covered with rocks, but the baboons often disturb these little fossil shrines to get at the scorpions who like to rest in the shade there.*



*It is also a working farm, to the delight of visiting students.*

Finally, family-friendly geology can be found wherever geoscientists gather, to be frank; a shared interest in geoscience (and an accessible bar) is all you need!



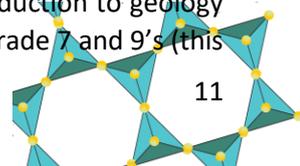
*Geoscience family-friendly outing, in the form of the Eastern Cape Geogathering in Makhanda (in 2007, mind; the child in the pram is now 1.8 m tall). No rocks required, except in your glass.*

## **Igor goes to school: geoscientist visits the Waldorf School, Pretoria**

**Igor Željko Tonžetić**

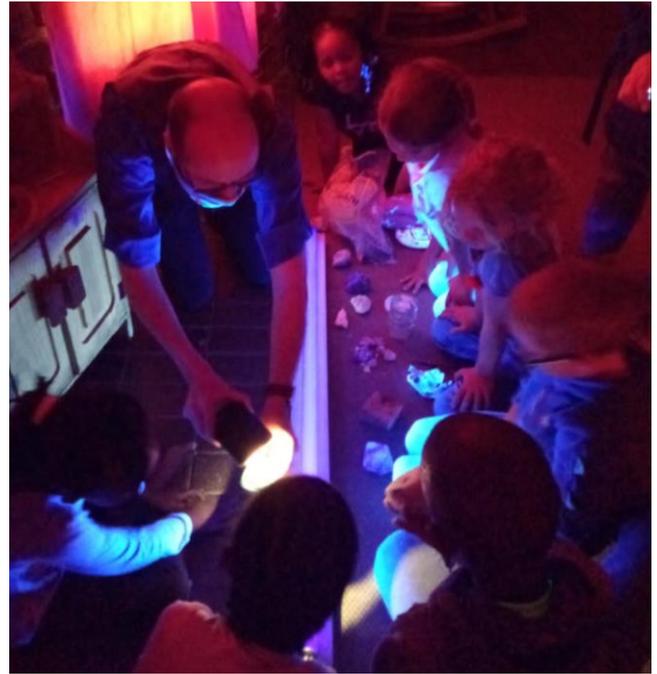
**University of Pretoria**

For Friday 20<sup>th</sup> August I was approached to do a bit of “geological outreach” at the Waldorf School in Rosemary Hill (Pretoria). What started out as being an introduction to 24 of Marguerite de Clerque’s Grade 6 kids ended up being a further introduction to geology for Candice van der Westhuizen’s Grade 7 and 9’s (this



focus was more geometrical with an emphasis on crystal classes and families – showing the importance of geometry in real world applications). To be sure... Candice had actually initiated the whole outreach... so I kind of owed her kids this much as well. Furthermore, I was later brought across to Yolande van Straaten’s kindergarten group to show the preschoolers some minerals as well.

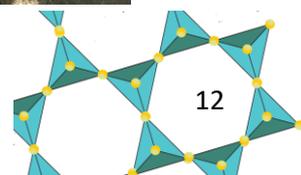
The plan was essentially to talk about the differences between crystals, minerals, rocks, gemstones and fossils, with type examples of each being presented. This then segued nicely into what constituted crystal families, finally going on to what makes a mineral species, a mineral species (explicitly using mineral varieties as a portal to the explanation). As a crescendo, fluorescent minerals were shown in a creatively darkened room (black disposal bags over all the windows) with the requisite fluorescent UV lamp (fluorescent calcite and fluorite were the type examples here... I don’t own any willemite or fluorescent hyalite).



Intermittently, those with questions were rewarded for their participation by viewing samples through a stereoscopic microscope (these were not a shortcoming... most of the students who were interested were able to have a short viewing of the microscope... of course, I couldn’t risk this with the kindergarteners). In short, what was supposed to be an hour or two-long presentation ended up being a very pleasant half day of introducing passionate kids, with enquiring minds, to rocks and minerals. The boys especially enjoyed breaking rocks... explicitly to demonstrate the concept of “cleavage”.



*Some electrons are excited. Some others, interested.*



It's difficult to know what far-reaching consequences our actions might have. There may be a future geologist or mineralogist in amongst those kids who was just waiting for a bit of a push. Doubtless some of them were already interested in rocks and minerals, but didn't know that a career could be made of them. Regardless, I had a chat with Marguerite sometime later and she mentioned something I said that made a particular impression on them... "Everything you see around you has either been grown or mined"... Lest we forget.

## The Wilds

Razina Mayet

***The Wilds is a nature reserve of 16 hectares on the outskirts of Houghton, set against lovely koppies with well-developed indigenous gardens. The Wilds is famously known for the boulders of quartzite in the reserve. There are many pathways nestled along the hillsides, with amazing views of the city of gold.***

***The following is a review from a parent with 3 kids below the age of 10.***

Looking for spots in Johannesburg for families and children to experience the great outdoors can be a daunting task for even the most perceptive of mothers. Having lived in Cape Town, our family was used to easy outdoor experiences such as trips to the beach and forested hiking trails. Once what we loved, our nature loving family felt closeted in the concrete jungle. But summer came around and the city turned green, so we decided to explore.

A Google search revealed a talk that was on bees, at the Killarney Wilds Nature area. We were in luck, it seemed, because this park was right under our noses in the heart of the city. We had expected to have to trek out of the city for any worthwhile nature experiences.

Upon arrival, we found suitable parking behind the gates inside the park where it was easy to park our car. There was security in the parking area and they were very visible which helped us to feel a bit safer.

We found the host of the bee talk and he began with his talk full of useful bee information. After the talk, the host took us on a lovely stroll up one path to the left of

the park to see a beehive, and gave us more information on bees.



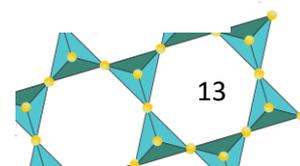
*A view of Sandton from the Wilds.*

My kids enjoyed it, but I think it was the green surroundings they loved most. They were excited to see cool trees, loads of plants and a whole host of complimentary man-made items in the area such as sculptures and information boards.

The stairs were easy enough to climb (although I doubt wheelchair friendly) but if you were old or pregnant you may take a while to ascend, and there are not too many railings to help if you lose your balance.

As we walked up the path we came across a lovely clearing with grass where we could have a small picnic and the kids could run around. We saw a whole host of birds flying through the park, but not much more in terms of small creatures. We felt safe and comfortable as we were in a large group and the children played in nature which was really special, and by and large, we enjoyed our experience.

A few months later we decided to come again and this time decided to take a walk to the right of the park. We noted the very quaint book drop at the entrance of the park which is such a nice addition to the park. We crossed over the bridge to the right side but I was nervous walking over the bridge and wondered how safe the bridge was. When we got to the other side, it was well kept and beautiful just like the left side but it seemed more desolate. We had a fairly large group but not as large as the previous time, and so we did feel quite unsafe. However, as we walked up, again we found a nice clearing where we could play soccer and enjoy the greenery.



Here, though, the noise of traffic was more pronounced than on the other side. We had our picnic but we were slightly sad we had not found any jungle gym play areas for the kids, but also we hadn't felt very safe at all as we saw no security presence and no one else was really on this side except us and one or two others.

***Visiting the Wilds in a group is recommended as the reserve is on a path of rejuvenation***

**Website to visit:**

<https://www.jhbcityparksandzoo.com/services-facilities/nature-reserves-bird-sanctuary/find-a-reserve/the-wilds-nature-reserve>.

<https://mountaingirl777.blogspot.com/2017/12/urban-adventures-wilds-houghton.html>.

**Facebook page: Friends of The Wilds, Joburg.**

## Melville Koppies

**Musarrat Safi**

Melville Koppies has kept its pristine nature, owing to a passionate group of volunteers who tend to the koppies daily needs, from uprooting alien species, up-keeping the security, developing sustainable pathways, conducting seasonal fires, constructing fire breakers, and hosting school kids from Grade RR learners all the way up to University students that study the fauna and flora of the area. The koppies are 150 hectares across forested areas, highland grasses, and outcrops of rock. This is all nestled in the suburbs of Emmerentia and Melville.



*The view, sitting on the quartzite ridge looking northwards.*

On a clear sunny morning the outline of the Magaliesburg Mountain range can be seen, as well as the CBD in all its splendour, and the cooling towers to the east. Trails run throughout the central koppies. There is a lecture hut for rest and a watering hole for the young ones to hydrate with a bathroom. At the lecture hut, an ancient Iron Age furnace is enclosed for a lesson in history.

The Witwatersrand quartzites are a prominent feature of the koppies. Nestled in the forested area, the ancient basement rock of the Kaapvaal Craton and its contact with younger rocks outcrop. The Westdene spruit runs through the central koppies and makes the hike an adventure. There is a site where gold-bearing reefs were believed to be, although none was found. There are many pathways for kids to explore, with bits of information along some of the paths. Learning to read a map and discover nature in the middle of Johannesburg should be on the to-do list, even for busy mums!



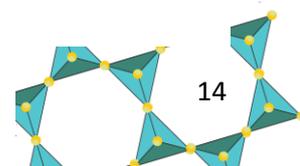
*Westdene Spruit, in the forested area.*

Hikes take place on Sundays. The Melville Koppies are access-controlled, and security is visible.

**Websites to visit:**

<https://www.mk.org.za/index.html>

<https://www.facebook.com/melvillekoppies/photos/a.292980134091372/3782283858494298/?type=3&theater>



## Origins Centre – Art meets Science

**Tammy Hodgskiss**

### ***Origins Centre, University of the Witwatersrand***

Origins Centre is situated at Wits University in Braamfontein, Johannesburg. The museum offers visitors a unique experience of Africa’s rich and complex heritage, taking you on a journey that begins with the evolution of our species, moves through the development of technology, art, culture and symbolism, and explores southern Africa’s diverse rock art traditions and cultures. The museum displays some of South Africa’s national treasures such as original painted rock art panels and engraved boulders, curated by the Rock Art Research Institute.

The Origins Centre museum values both research and community engagement; aiming to stimulate discussion and sharing of ideas through workshops, seminars, talks, school tours, educational programmes and temporary exhibitions. The museum is an educational and learning space, which offers opportunities for adults and children to learn about the past in an engaging and interactive way. The newly renovated museum contains displays showing original archaeological artefacts and rock art, engaging video content, interactive exhibits and contemporary artworks.



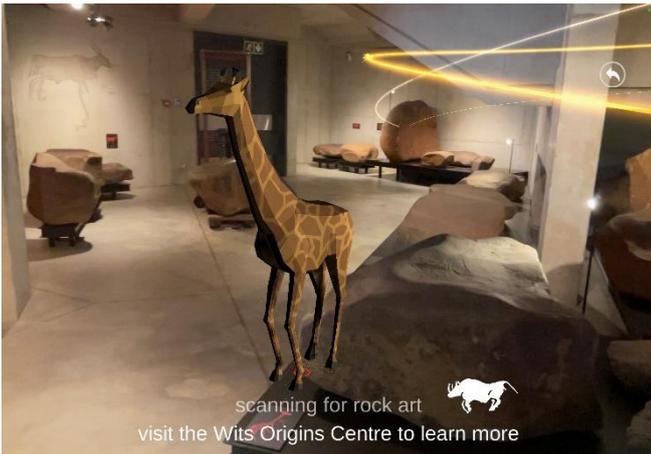
*Interactive fossil casts. Pictures here, Brian Mogaki showing the Taung Child skull. Picture: Captain Marius Sullivan.*

The museum offers kids’ events which include enjoyable, hands-on activities that are fun for the whole family. The events are themed around archaeology, palaeosciences, geology and environmental sciences – from mock archaeological excavations and dinosaur egg hunts to geological explorations and making paint from ochre to make your own rock art. These events help children learn about the past and the world around them through immersing themselves in it, getting their hands dirty, having fun and meeting real archaeologists and palaeontologists. Covid regulations permitting, these events are held on Saturday mornings, usually once a month.



*Archaeology rocks! Kids activity days at Origins Centre. Pictures: Tammy Hodgskiss.*

The museum also offers an incredible augmented reality experience through the OriginsCentreAR App. Animals engraved into rock thousands of years ago appear in front of you, hyena artworks come to life, cackle and run away, or South Africa’s dinosaurs, like Ledumahadi and Dracovenator, spring to life. The app can be downloaded for free on IOS and Android. Parts of the experience can be enjoyed from the comfort of your home (who wouldn’t want a dinosaur on their bed?), others are designed to be enjoyed in the museum using prompts to awaken the animals.



*Origins Centre comes to life through the Augmented Reality app OriginsCentreAR.*

Origins Centre hosts temporary exhibitions which either include kid-friendly sections, or which we develop specifically on our ‘activity days’ so that children can be entertained while their parents peruse the exhibition. In 2021 the *Origins of Early Sapiens Behaviour* exhibition will be on show. The exhibition showcases exceptional South African archaeological evidence dating back to between 120 000 and 50 000 years ago in South Africa – evidence of some of the innovative behaviours of early modern humans, such as advanced stone tool technologies or the earliest abstract art. The exhibition has a state-of-the-art interactive kids’ area with puzzles, activities and a light table, that are bound to entice all ages.



*The kids’ interactive area at the Origins of Early Sapiens Behaviour exhibition. Picture: Tammy Hodgskiss.*

During your visit you can have a meal at the restaurant or have a look at the Origins Center shop and book shop, which sells a range of locally made art and curios and an excellent range of books with a focus on

Africana, rock art, the environment and children’s books.

Come and enjoy the Origins experience with your kids and interact with Africa’s amazing past!

**WHERE TO FIND US**

University of the Witwatersrand, Corner of Yale and Enoch Sontonga Roads, Braamfontein, Johan-nesburg.

GPS 26° 11’ 34.39” S 28° 01’ 44.62” E

**HOURS**

Monday – Friday: 09h00 to 17h00  
Saturday and public holidays: 09h00 to 16h00.

Tickets: Tickets can be bought on webtickets or at the door. Adult R85; Children/Wits students R40; Wits staff/pensioners R65.

**CONTACT US**

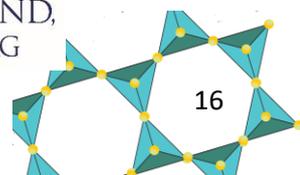
For bookings, enquiries or to sign up for the mailing list: [bookings.origins@wits.ac.za](mailto:bookings.origins@wits.ac.za); [tammy.hodgskiss@wits.ac.za](mailto:tammy.hodgskiss@wits.ac.za); 011 717 4700.

Website: [www.wits.ac.za/origins](http://www.wits.ac.za/origins)

Follow the museum on social media to find out what’s on - Facebook and Twitter: @originscentre; Instagram: @originscentre\_wits.



UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG



## Walter Sisulu National Botanical Gardens – a geological jewel near Johannesburg

Albertus Smith

*Department of Geology, University of Johannesburg*

### Introduction

Approximately 25 kilometers northwest of Johannesburg's central business district, only 2 kilometers off Hendrik Potgieter Road in Ruimsig, lies the Walter Sisulu National Botanical Garden. This location comprises 25 hectares of cultivated garden and 275 hectares of nature reserve. It acts as host to a world-class collection of plants native to South Africa, where highlights include a succulent rock garden (figure 1), a children's garden, and a cycad garden. There is also abundant wildlife which include Verreaux's eagles, honeybadgers, servals and armadillos. Large lawns also occur across the garden for friends and family to relax and have a picnic. Other than containing an incredible collection of native flora and fauna, it also acts as a small snapshot of what the famous Witwatersrand looked like before urbanization and housing development started to cover it.

### Geological Gardens

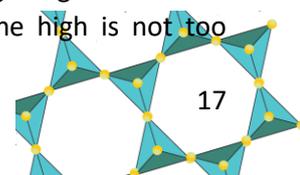
For those of us more geologically inclined, Walter Sisulu National Botanical Gardens also has a lot to offer. Not only is the *in situ* geology of the garden interesting and significant, but so is the *ex situ* geology. About 200 meters from the main entrance, you can find the Geological Garden. This garden features large rock blocks brought to the garden from across South Africa to illustrate the geological history of South Africa, arranged from old (Paleoarchean tonalitic gneiss) to young (Permian coal and petrified wood). Parts of the rock blocks have also been polished to provide a better view of the texture and mineralogy. Highlights in the Geological Garden include: Witwatersrand Supergroup gold reef conglomerates; lava flows from the Ventersdorp Supergroup (figure 2); stromatolites from the Transvaal Supergroup (figure 3); a block of the Merensky Reef from the Bushveld Complex; and a variety of alkaline rocks from the Pilanesberg Complex.

### The Orange Grove Formation at Witpoortjie Falls

The local geology of the garden is best exposed at the Witpoortjie Falls, which is about 700 meters from the main entrance, and acts as the most famous landmark of the garden (figure 4) as well as the nesting site for the Verreaux's eagles. Exposed in the cliff face are the sandstones and shales of the Orange Grove Formation, which is the basal unit of the Mesoarchean (2.96-2.78 Ga; Kositsin and Krapež, 2004) Witwatersrand Supergroup. The Witwatersrand Supergroup is world-famous for containing the world's largest reserves of gold within the conglomerates of the upper Central Rand Group (Tucker et al., 2016). However, the exposed section at the Witpoortjie Falls is also significant for marking the base of one of the oldest supracratonic sedimentary successions in the world (Smith et al., 2013), where the chaos of greenstone belts was followed by the relative calm of continental platforms almost three billion years ago. When standing close to the falls and looking up at the geology, the sole marks of ripples can clearly be seen in the exposed sandstones. The direction of the ripples can also be observed as changing between different layers. The Orange Grove Formation is interpreted to have been deposited in a shallow marine environment (McCarthy, 2006), generally strikes southeast to northwest, and can also be observed in the Johannesburg suburbs of Orange Grove and Melville (i.e., Melville Koppies Nature Reserve).

### The JCI Geological Trail

Directly to the right of the Witpoortjie Falls are a set of steps that mark the start of the JCI Geological Trail. This is an approximately 3.5-kilometer-long hiking trail that goes up a hill to the side of Witpoortjie Falls, along Muldersdrif se Loop (the river feeding the waterfall), and then to the northwest to start a clockwise loop of the nature reserve. At the start of the hike, some of the basement schists can be seen in the walking path. The top of the waterfall provides a good view of the Orange Grove Formation to the south, and a large fault can also be observed. The rest of the trail goes into the Parktown Formation shales, with the iron-rich Water Tower Member (Smith et al., 2013) visible in outcrop next to Muldersdrif se Loop. Important viewpoints are marked by plaques explaining the geological features. Although some parts are steep, the high is not too



technically challenging and should take approximately an hour to an hour and a half to complete, depending on walking pace and breaks taken.

### Conclusion

So, to conclude, Walter Sisulu Botanical Gardens is a great day out for people and families who want to get away from the city buzz, and don't want to travel far to do so. It offers something for a wide variety of activities

and interests, including plant lovers, animal lovers, rock hunters and those who just want to sit back and relax. The garden also managed to get some international recognition by making the Huffington Post's list of 13 stunning arboreturns around the world in 2012 ([https://www.huffpost.com/entry/best-botanical-gardens-us-world\\_n\\_1879112](https://www.huffpost.com/entry/best-botanical-gardens-us-world_n_1879112)). However, as an attraction for geology lovers, the pleasure of its Geological Garden and the significance of its underlying geology cannot be highlighted enough!



*Figures: A selection of attractions at Walter Sisulu National Botanical Gardens: 1) The succulent rock garden. 2) A polished slab of a frozen lava flow from the Neoproterozoic (ca. 2.78-2.70 Ga; Van der Westhuizen et al., 2006) Ventersdorp Supergroup, showing amygdales (frozen gas bubbles filled with quartz) and pieces of quartzite xenoliths. The block is approximately 1.5 meters across. 3) A block of dolostone from the Neoproterozoic (ca. 2.59-2.52 Ga; Eriksson et al., 2006) Malmani Subgroup of the Transvaal Supergroup containing stromatolites, which are domes formed by colonies of bacteria in shallow water. The block is approximately 1.5 meters across. 4) Witpoortjie Falls with outcrop of the quartzites (tan coloured) and shales (dark red brown coloured) of the Orange Grove Formation of the Mesoproterozoic (2.96-2.78 Ga; Kositcin and Krapež, 2004) Witwatersrand Supergroup visible in the surrounding cliff faces. The waterfall is approximately 70 meters high.*

### Location

27°50'40.7"E 26°05'13.8"S

<https://www.google.com/maps/dir/-26.1137846,27.9834734/walter+sisulu+botanical+gardens/@-26.0970997,27.8455249,12z/data=!3m1!4b1!4m9!4m8!1m1!4e1!1m5!1m1!1s0x1e95994c450eb50f:0xcd11e8cc251f3c59!2m2!1d27.844839!2d-26.086548>

### Geological Highlights

- The Geological Garden, featuring large rock samples, arranged according to age, of some of the most significant geological units in South Africa
- The basal section of the Witwatersrand Supergroup (Orange Grove Formation) exposed in the local waterfall (Witpoortjie Falls)
- The 3.5 km JCI Geological Trail, starting in basement schists and going up section through the Orange Grove Formation and into the base of the Parktown Formation

### Website

<https://www.sanbi.org/gardens/walter-sisulu/>

### Acknowledgements

A special thank you to David Ernst who provided the photos for this contribution. Also a very special thank you to Professor Nic Beukes, who first introduced me to the geological significance of Walter Sisulu National Botanical Gardens, and to my late father, Pieter Smith, who regularly took me there during my childhood to show me all the unique and beautiful flora.

### References

Eriksson, P.G., Altermann, W. and Hartzer, F.J. (2006). The Transvaal Supergroup and its Precursors. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds), The Geology of South Africa. Geological Society of South Africa, Johannesburg, pp. 237-260.

[https://www.huffpost.com/entry/best-botanical-gardens-us-world\\_n\\_1879112](https://www.huffpost.com/entry/best-botanical-gardens-us-world_n_1879112)

<https://www.sanbi.org/gardens/walter-sisulu/>

Kositcin, N. and Krapež, B. (2004). SHRIMP U-Pb detrital zircon geochronology of the Late Archaean Witwatersrand Basin of South Africa: Relation between zircon provenance age spectra and basin evolution. *Precambrian Research*, 129, 141-168.

McCarthy, T.S. (2006). The Witwatersrand Supergroup. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds), *The Geology of South Africa*. Geological Society of South Africa, Johannesburg, pp. 155-186.

Smith, A.J.B., Beukes, N.J. and Gutzmer, J. (2013). The Composition and Depositional Environments of Mesoarchean Iron Formations of the West Rand Group of the Witwatersrand Supergroup, South Africa. *Economic Geology*, 108, 111-134.

Tucker, R.F., Viljoen, R.P and Viljoen, M.J. (2016). A Review of the Witwatersrand Basin - The World's Greatest Goldfield. *Episodes*, 39, 105-133.

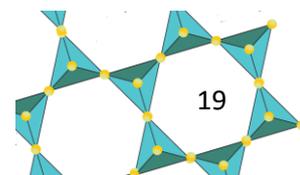
Van der Westhuizen, W.A., De Bruijn, H. and Meintjies, P.G. (2006). The Ventersdorp Supergroup. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds), *The Geology of South Africa*. Geological Society of South Africa, Johannesburg, pp. 187-208.

## Other Gems

### Graphitic rubies in Greenland

An international team of researchers from Canada, Denmark, Australia and the U.K. have discovered 2.5 billion year old (that's either Neoproterozoic or Palaeoproterozoic, depending on your perspective) rubies containing graphite in paragneisses from southern west Greenland. The announcement was made through the University of Waterloo (Canada), academic home of the research group leader (inferred, depending on which article you read), Dr Chris Yakymchuk, with [one such press release available here](#) (there are plenty more).

*(article continued on pg. 21)*





For more info: [minsas@gssa.org.za](mailto:minsas@gssa.org.za)

## INVITATION FOR SUBMISSIONS TO THE NEXT THEMED ISSUE OF THE GEODE

Minsas invites its members to contribute submissions for our next issue of the Geode, on the theme of “*New approaches to old analytical techniques*” (see below), for March 2022.

Submissions can be sent to [minsas@gssa.org.za](mailto:minsas@gssa.org.za) and should reach us by 28<sup>th</sup> February 2022.

Techniques such as XRF and XRD have been routine since the 1970s, and around much longer. Same goes for mass spectrometry. ICP-MS has been routine since the 1990s. In all of these cases, there have been improvements to electronics, detector sensitivity, and vacuum technology which have allowed for big leaps forward over the years. XRF was virtually unchanged from the 1970s til the 2000s, apart from increased utility of analytical logistics; now we have hand-held XRF producing research-quality data. Mass spectrometers have made similar leaps every decade or so (single collector to multicollectors; gas/solid source ionization to beams of O, lasers, plasmas, etc.). We can now analyse major & trace elements by making stacks of fused glass discs, cut & polished and zapped with lasers or microprobes to get precise data more quickly. Are you doing something that your predecessors couldn't, or wouldn't? Tell us about it!



## Earn CPD points through mentoring!

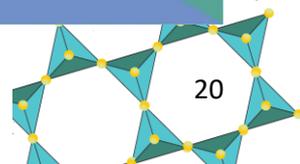


Be “the mentor you wish you had” and assist in giving some guidance to geology students by signing up to be a mentor through the Bridge the Gap Geosciences Guidance Program (BTG).

BTG is a student run organisation that focuses primarily on mentorship between undergraduate and postgraduate students. However, all interested individuals are invited to “bridge the gap” between students and industry by joining the BTG program. This could take the form of mentorship, giving a talk, leading an excursion or simply providing sponsorship.

To get involved please complete the Google form via this link:

<https://forms.gle/Sf5tMciuSStAQuFL8> or email [bridgethegap.wits@gmail.com](mailto:bridgethegap.wits@gmail.com) for more information.





Evidently not only are these amongst the oldest rubies yet discovered (and west Greenland supracrustal rocks would be a good place to look for old minerals), they contain graphite, signifying the presence of (older still) organic life. While the existence of Archaean organic life is not in itself novel, its presence within gemstones (corundums, in this case), is, and in fact it appears that the reducing environment created or signified by the presence of the graphite appears to be critical in facilitating the growth of the rubies. So basically confirmation that even when life was bacterial, we were already obsessed with jewellery.

*Contributed by S. Prevec*

### Why do Lionel Messi and Cristiano Ronaldo possess pyritic Au-Cu-Zn-Fe ore deposits?



*One of many images of recent Ballon d'Or trophies available online.*

'Tis the season for soccer/football to publicly celebrate its worthies, and one such celebration is the awarding of the annual Golden Ball, or in the *lingua franca* by which soccer is administered, which in this case is in fact coincidentally the French language (the direct translation of *lingua franca*), is known as the Ballon d'Or. The Ballon d'Or has been awarded annually since 1956, and consists of a gold-coated (Au) brass (Cu-Zn) sphere mounted on a plinth of mineralised rock, thus ensuring that each such trophy is unique in its presentation.

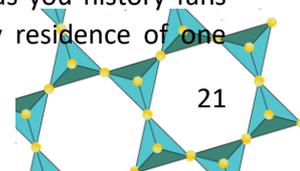
The base of the trophy is described as "pyritic rock", and closer scrutiny suggests that coarse-grained cubic and particularly dodecahedral pale yellow pyrites do indeed contribute a significant part of this assemblage. There is some indication of a grey metallic mineral as well, although it is difficult to distinguish the natural colours from these images, and from possible tarnishing and other deliberate coatings and enhancements that might have been applied in making the trophy mount. No information is easily (ok, 15 minutes online) available regarding the source of the ores for the base, so here's my theory.



[MinDat](#) reveals that beautiful dodecahedral pyrites are found from the eastern end of the island of Elba, currently part of the Livorno province of the Tuscany Region, which is Italy's most mining-intensive region.

This is also where Chianti originates, incidentally. Elba, just offshore here, is an island consisting of tectonically sheeted ocean floor basalts (i.e., ophiolites) which have experienced iron-rich fluid metasomatism, resulting in the formation of iron ore mines which were exploited from the fourth century B.C. until the latter decades of the 20<sup>th</sup> century (Tanelli et al., 2001), famed in particular for their hematites and tourmalines. Pyrite is prominent in the northeastern deposits (Tanelli et al., 2001). A pyritic hematite ore looks about right.

Another appealing element to the prospect of the use of Elbaic ores for football's iconic trophy by the French presiding authorities is that Elba, as you history fans will be aware, was the temporary residence of one



Napoleon Bonaparte from May 1814 to February 1815, before he decided to revisit Europe for one last final set of whistle stops (next stop: St Helena; end of the line).



The island of Elba (modified after [Kelisi](#)). Iron ore mine locations after Tanelli et al. (2001). Napoleon's residence at Portoferraio also marked.

Somehow, the notion of sending ores from Napoleon's enforced temporary retirement home as part of gifts to various Portuguese and (mostly) Spanish-based colleagues feels poetic. As the previous twelve Ballons d'Or have been awarded to either Cristiano Ronaldo (5) or Lionel Messi (7), who now plays his football in Paris, my feeling is that a polite visit to Mr Messi (as he's got the most spares) for a small sample with which to analyse Pb isotopes could establish once and for all the source of the ores. I don't believe there is any other way.

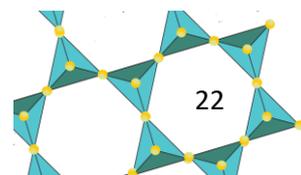
Tanelli, G., Benvenuti, M., Costagliola, P., Dini, A., Lattanzi, P., Maineri, C., Mascaro, I. & Ruggieri, G. (2001) The iron mineral deposits of Elba Island: state of the art. *Ofioliti*, v. 26 (2a), 239-248.

Contributed by S. Prevec

*Do you have an analytical service relating to sample preparation, mineral analysis, mineral extraction, or mineral identification?*

*Do you have capacity to conduct additional services and to get paid for it?*

*If your answer to any of these questions is "yes, I guess so", then you could be advertising in this space at very reasonable rates, making some revenue, and contributing to the geoscience economy of the nation. What are you waiting for? Right now, someone else is making the profits you could be making, stealing your business! So get busy!*





# IMA 2022

## MINERALOGY AND SPACE

### Lyon, 18-22 July

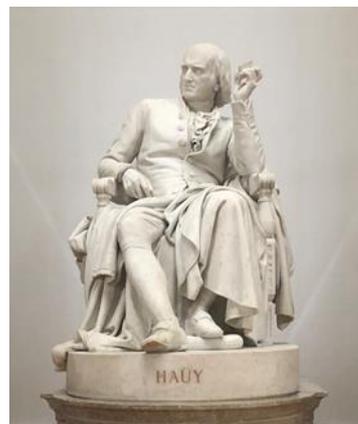
Following the tradition of quadri-annual general meetings of the International Mineralogical Association organized by national societies, the French Society for Mineralogy and Crystallography will host the 23rd general meeting of the IMA in Lyon, France during 18-22 July 2022.

2022 is the year to celebrate mineralogy. It marks the bicentennial of the death of René Just Haüy (born 1743) who is a father of modern mineralogy and crystallography. Two centuries ago is also when Haüy's *Traité de mineralogy* and *Traité de cristallographie* were published. Back to our days, in 2022, the last two main Mars exploration programs, Perseverance (Mars2020) and Huoxing 1, will just have had enough time for science return and post-processing. With the return of Hayabusa 2, for the first time, fragments of a primitive carbonaceous asteroid will be analysed.

The 23rd meeting of the IMA will mark these celebrations. In Lyon, we want to paint IMA 2022 with the colours of space exploration. Alongside the more traditional mineralogist we want to inspire the new generation and make a step closer toward the final frontier. The meeting will bring together all the new facets of modern mineralogy; it will be the playground where mineralogy as we know it will meet exploratory planetology, and it will be the place to celebrate two centuries of mineralogy.

#### The overarching themes of the IMA2022 are:

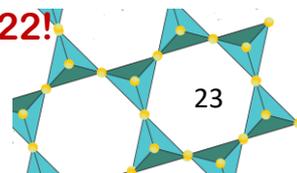
- \* Mineral Systematics
- \* Physics and Chemistry of Minerals
- \* Ores and Ore Mineralogy
- \* Mineralogy and Petrology
- \* Planetary Mineralogy
- \* Planetary Interiors
- \* The Dynamical World Of Minerals



To stay updated visit regularly the official conference website: <https://ima2022.fr> and follow us on Facebook and twitter. The venue is the Lyon Convention Centre, a state-of-the-art, impressive convention centre featuring 25,000m<sup>2</sup> of innovative architecture and situated between the Rhône river and the Tête d'Or Park.

On behalf of the French Society for Mineralogy and Crystallography, the leading committee is formed of Razvan Caracas, Herve Cardon, and Cathy Quantin-Nataf.

**We are looking forward to seeing you in Lyon in 2022!**



## Bruce's Beauties: Bruce visits the Editor

When you have a collection of ancient, variably-labelled vials and hand specimens in your department and you are looking for diagnostic advice, you have a few options. You can break off a few grains and send them for determination of the crystal lattice group by XRD, thereby identifying the mineral Group. Or you can cut a thin section and then assess the optical properties, or polish it further and assess the geochemistry by SEM or EPMA surface analysis. Or, you can take advantage of the proximity of Bruce Cairncross and have him pop by.

In our case, the samples were collected by Prof. Edgar D. Mountain, the Head of the Geology Department at Rhodes from 1929 to 1972 (!). Here are some highlights (for me) from Prof. Cairncross's visit, in lieu of a new assortment of mineral photos this month. As Bruce says, "Once upon a time..."



Bruce holds a green, laminated translucent unlabelled specimen up to the light, identifying it as mtorolite, the local name for chrome-bearing chalcedony from the mines at Mtoroshanga (hence the name), on the Great Dyke, Zimbabwe. The nickeliferous variant, chryso-prase, is similar in appearance, but does not have a prominent local source.



The sample at left is a polyhedral quartz (or agate) crystal, where the apparently idiomorphic shape is in fact a function of growth between planar irregular joint boundaries, and has no crystallographic relevance. The interior of this crystal is largely hollow, and is partially infilled in this example by drusy silica, another indicator of its probable paragenesis as a fluid precipitate (there is an alternative proposed origin of these as pseudomorphs). The specimen is probably from eSwatini, as Mountain published on this subject based on samples from there in 1942.



**Minsa Crossword for December 2021**

This issue’s crossword theme is “Minerals beginning with A” (you can see where this is headed, hopefully not too frequently). This has rendered the clues exceedingly simple, as each one is supplemented by the extra clue that it begins with “A”. Think of it as an early Christmas gift of an extra-achievable crossword, with more boring clues than usual. A crossword for those who normally can’t be bothered with crosswords, if you will. Try it out on your students...

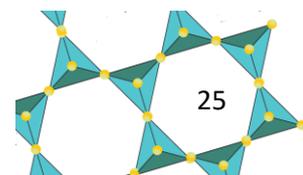
	1					2		3					4
1													
				2									
				5									
			3										
4										6			
			5										

**ACROSS:**

1. A major ore of arsenic, it is also commonly associated with gold.
2. A variety of serpentine.
3. An Fe and Mn-rich dolomite-like carbonate mineral.
4. The most calcic species of plagioclase feldspar.
5. A sodic clinopyroxene, also formerly known as acmite.

**DOWN:**

1. Sodic amphibole found in nepheline syenites.
2. The main phosphate mineral in rocks.
3. A structural polymorph of Mg-bearing calcite.
4. The plagioclase feldspar found in massif-type anorthosites (extending the “A” theme).
5. A polymorph of rutile.
6. Technically not a mineral, but an amorphous organic resin.



**Minsa Crossword Solution for September 2021**

This issue’s crossword theme was “minerals and rocks mentioned in the Bible”.

		1 G	1 O	L	D			2 T	2 O	P	3 A	Z
	4 C		I						N		M	
3 C	H	A	L	5 C	E	D	O	N	Y		E	
	R			O					X		T	
	Y			P		6 T					H	
	4 S	A	P	P	H	I	R	7 E			Y	
	O			E		N		M			S	
	5 P	E	A	R	L			E			T	
	R							R		8 A		
	A							A		G		
	S		6 C	A	R	N	E	L	I	A	N	
	U							D		T		
	7 S	I	L	V	E	R			8 F	E		

**ACROSS:**

1. This metal is mentioned more than 400 times in the Bible (the most frequently cited).
2. A yellow gemstone mentioned in the King James translations of the Bible, likely a misattribution; up to the Middle Ages, any yellow gemstone was referred to as this mineral, now restricted to use for a specific Al- and F-bearing nesosilicate.
3. A cryptocrystalline aggregate of two polymorphs of silica; namely quartz (triclinic) and moganite (monoclinic), named for the city in westernmost Asia, across the straits from what is now Istanbul.
4. The blue gemstone variant of corundum, famously derived from Sri Lanka in antiquity. The world’s main producer is Madagascar.
5. The singular of the aragonitic spheres formed by molluscs, and harvested along the Indian Ocean coastline in antiquity.
6. The brownish-red semiprecious variant of 3-across, its name derives from the similarly-coloured cornel cherry, found in southwestern Asia.
7. The metal used as the primary medium for coinage in the Holy Land during the Roman occupation, mined in southern Greece (very near Athens) in antiquity.
8. The most common base metal, mined in antiquity between India and the eastern Middle East, the earliest use of it was from meteoritic finds.

**DOWN:**

1. An organic liquid deployed in the Bible for anointing. This is a bit of a liberty in this context, as the Biblical variant is likely derived from fruits or plants, rather than minerals.
2. The banded, typically (but not necessarily) black variant of 3-across, and/or 8-down. The red variant is known as sard, or sometimes sard\_\_\_ (this mineral), prominent in the Holy Land and in India.
3. The violet gemstone, the occidental version of which is a coloured variant of quartz (mined in Greece and Egypt in antiquity), while the oriental version is a variety of corundum.
4. The green variant of 8-across, resulting from high Ni content, this stone is described as the tenth foundation stone of the celestial Jerusalem in Revelations.
5. The metal that provides the main constituent for Bronze, the Age of which preceded the Age of 8-across around the second millennium B.C.
6. The second most prominent metal in bronze, and strongly preferred to the other naturally occurring bronze alloy component, arsenic, this metal was mined in southern Turkey in antiquity.
7. The green (Cr-contaminated) gemstone variant of beryl, constituting the fourth foundation stone of celestial Jerusalem (Revelations); also the colour of Oz’s capital city (as in “The Wizard of”).
8. Continued at bottom of right-hand column:

8. A rock (rather than a mineral) consisting of a mixture of quartz and 3-across, typically grey and laminated, named for its discovery site near the mouth of the Achates River in Sicily, in antiquity.

Note: The recommended deadline for submissions for the next issue of the Geode is February 28, 2022.

