Tyndall Stone

Hunting Ordovician Fossils in Downtown and Inner-City Calgary

Article and photos by Tako Koning

The Tyndall limestone is iconic building stone from the Late Ordovician (450 million years old) Red River Formation, at Garson Quarry, near the town of Tyndall, about 30 km northeast of Winnipeg, Manitoba. The Tyndall limestone, also known as Tyndall Stone, occurs within the Red River's Selkirk Member, which is 43 m thick (Coniglio, 1999). The Tyndall Stone is extracted from a 6 – 8 m thick interval within the lower part of the Selkirk Member (Pratt et al., 2016).

Tyndall Stone is used throughout Canada as an ornamental building stone. It is one of the most beautiful building stones in the world. In Ottawa the interior of the Parliament Building, Centre Block, the Confederation Hall and the Hall of Honour are clad in Tyndall. The exterior of the Museum of

Figure 1. The entrance to the Bank of Montreal Building (currently Goodlife Fitness) on the northeast corner of 1 Street and 8 Avenue SW, (Stephen Avenue Mall), the columns and façade are entirely Tyndall Stone.

Civilization in Gatineau, Quebec is clad in Tyndall. The exteriors of the Provincial Legislature buildings in Winnipeg and Regina are Tyndall. It clads the University of Alberta's Tory Building, the Rimrock Hotel in Banff, the Chateau Lake Louise and the Empress Hotel in Victoria, among many others.

The Tyndall limestone was deposited in a tropical, shallow marine environment. It is fine grained and cream coloured with pervasive mottling of darker dolomitic limestone. The highly distinctive mottled appearance is due to trace fossils known as *Thalassinoides,* which are fossilized burrows left behind by organisms, possibly worms and crustaceans such as mole shrimp, that burrowed through the soft lime mud during or just after its deposition. These organisms were soft-bodied, leaving no fossilized remains for palaeontologists to study. This adds to the enigma of the Tyndall Stone that to this day no one knows which organisms caused the extensive burrows and mottles in the Tyndall.

The Tyndall is highly fossiliferous at the locations described in this article. The fossils represent life that flourished on an ancient sea floor. A variety of fossils can be observed including nautiloids, gastropods, stromatoporoids, brachiopods, sponges, corals, and large—up to 25 cm diameter—circular "*Receptaculites*" (Figure 2; now referred to the genus *Fisherites*; **Dr. Brian Pratt**, pers. comm.) which is informally called "sunflower coral" even though it is not a coral. This fossil is an enigma for palaeontologists, having been assigned to various unrelated groups since its discovery. Relatively recently it was hypothesized to belong to a group of calcareous algae, but its true relationships remain a topic of speculation (Nitecki et al., 1999). Its skeleton is generally globular, though commonly squashed due to sediment compaction. Basically it comprises a hollow, double-walled spheroid, with inner and outer walls separated by a layer of closely spaced pillars (Figures 29 and 30). Diamond-shaped plates cap each end of a pillar and fit together in a mosaic, forming the inner and outer walls. The plates and pillars are arranged in a double spiral pattern, like the arrangement of seeds in a sunflower head—hence the common name "sunflower coral." The appearance of the fossil on surfaces of Tyndall Stone is quite variable (Figures 27, 28), depending on how it was cut.

Figure 2. "*Receptaculites,*" the misnamed "sunflower coral." The darker mottled features in the limy matrix, so characteristic of Tyndall Stone, are burrow traces known as *Thalassinoides.*

Nautiloids are cephalopods related to modern day squids or the shelled *Nautilus*. Nautiloids with straight shells are called **orthocones**, whereas those with curved shells are **cyrticones** (Teichert, 1964).

Downtown

On the north side of the classic art-deco style AGT (Alberta Government Telephones) Building at 119 6 Avenue SW, built in 1929, one can observe specimens of "*Receptaculites.*" *Thalassinoides* are well displayed there. The dolomitized traces are more resistant to weathering than the limestone matrix, so they are prominently etched on the surface of the blocks by almost a century of weakly acidic rain.

Ten-metre-tall Corinthian-style columns of Tyndall Stone grace the entrance of the heritage Bank of Montreal Building on the northeast corner of 1 Street and 8 Avenue SW, built in 1932 (Figure 1).

Similar style columns of Tyndall Stone can be seen at the entrance to the Centre for the Performing Arts, southeast corner of 1 Street and 8 Avenue SE. Built in 1930, it was originally called the Calgary Public Building. Both buildings are on the Stephen Avenue Mall.

Further west on 8 Avenue, between 3 and 4 Streets SW, the south-facing façade of the former Eaton's building is clad in Tyndall Stone (Figure 3). A block north of this, the Shoppers Drug Mart on the southeast corner of 7 Avenue and 3 Street SW has a more modern Tyndall Stone façade (Figure 6).

The front and west sides of the John J. Bowlen Building, formerly the Calgary Court House, at 620 7 Avenue SW, are Tyndall Stone (Figures 4 and 5).

The oldest Tyndall-clad building in Calgary is not downtown. Rather, it is the 109-year-old Canadian Imperial Bank of Commerce (CIBC) building in Inglewood, at 1230 9 Avenue SE which was built in 1911 and continues to function as a CIBC bank. There are many other Tyndall-clad buildings in downtown Calgary: keep your eyes peeled!

Figure 3. South-facing front of the former Eaton's building (currently Hy's Steakhouse), on 8 Avenue between 3 Street and 4 Street SW, entirely clad in Tyndall Stone.

Figure 4. Entrance to the John J. Bowlen Building, former Calgary Court House Building, 620 7 Ave. SW. Built in 1969, inaugurated by Premier Harry J. Strom. White blocks are Tyndall Stone.

Figure 5. John J. Bowlen Building. The west side is entirely clad in Tyndall Stone.

Figure 6. Shoppers Drug Mart, 7 Avenue and 3 Street SW. The façade surrounding the entrance is Tyndall Stone.

Kensington Safeway Store, Sunnyside

In front of the Safeway store in Sunnyside-Kensington (northeast corner of 10 Street and 3 Avenue NW), ten blocks of Tyndall Stone are present (Figure 9). The top dimensions of each block are about 1.0 m by 1.0 m and the depth is 0.5 m. These blocks allow the observer to study the fossils in 3 dimensions (top, front, sides and back).

For a palaeontologist or anyone interested in fossils, the blocks provide a unique opportunity since, by standing beside these blocks and looking down, you can imagine yourself snorkeling above and looking down through clear, warm water on the organisms which lived on or above the Late Ordovician sea floor, 450 million years ago.

Figure 7. Safeway; *Maclurina* gastropod. Dollar coin for scale.

Figure 8. Safeway; "*Receptaculites*." Dollar coin for scale.

Figure 9. Kensington Safeway. Blocks of Tyndall Stone are randomly placed on the plaza for use as benches.

Figure 10. Safeway; a large sponge, *Aulacopella*, and a straight-shelled (orthocone) nautiloid in the lower right corner. Dollar coin for scale.

Figure 11. Safeway; cross-section of a *Favosites*-like "honeycomb" tabulate coral head. Ruler is 15.7 cm long. See detail, Figure 11a (next page) and compare to Figure 15 at SAIT campus.

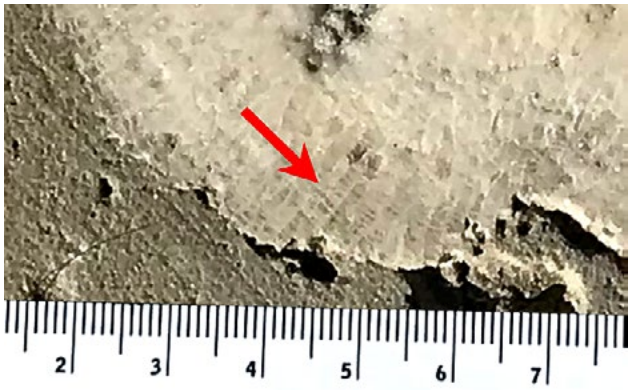

Figure 11a. Safeway; enlarged detail of Figure 11, showing coral tabulae and corallite walls (arrow). Scale in cm and mm.

Southern Alberta Institute of Technology (SAIT)

The best location in Calgary to view Tyndall Stone fossils is at the SAIT campus, south of 16 Avenue between 10 and 14 Streets NW. In the south-east corner four large buildings are covered by slabs of Tyndall Stone. These slabs are still relatively new so the texture is quite fresh and unweathered, allowing the fossils to be seen almost in their original state. There is nearly 0.9 km of continuous, accessible Tyndall exposure at SAIT, so you will see new specimens with repeated visits. It's best to visit with others to get the benefit of more eyes on the rocks and more opportunity for discussion.

Figure 12. Safeway; side of a block showing a laminated organic buildup, perhaps stromatoporoid and/or coral. Note how resistant burrows stand out in relief. Block is 0.5 m tall.

Figure 13. SAIT; north entrance to the Senator Patrick Burns Building which was built in 1967. The white columns are Tyndall Stone. The slabs have been subject to 53 years of weathering but show very little signs of deterioration, allowing the numerous fossils to be clearly viewed.

Figure 14. SAIT; This is the south side of the Senator Patrick Burns Building, entirely clad with white, fossiliferous Tyndall Stone.

Figure 15. SAIT; A "honeycomb" tabulate coral colony, probably *Trabeculites* or *Saffordophyllum*. Note the closely-set polygonal corallites.

Figure 16. SAIT; a gastropod (snail), cf. *Hormotoma* sp., height approximately 4 cm.

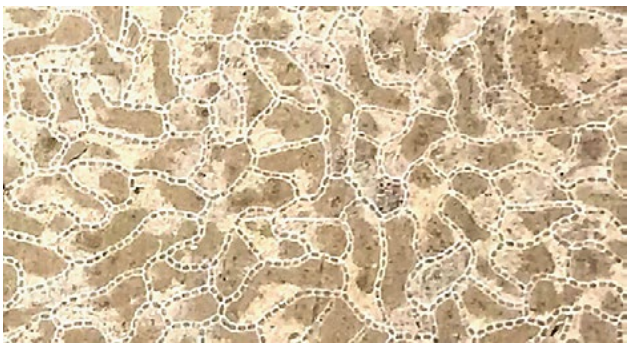

Figure 17. SAIT; top image shows a large tabulate coral colony, probably *Catenipora*, a "chain coral." Diameter approximately 40 cm. Lower image is an enlarged detail, showing the chain-like arrangement of the corallites in cross-section.

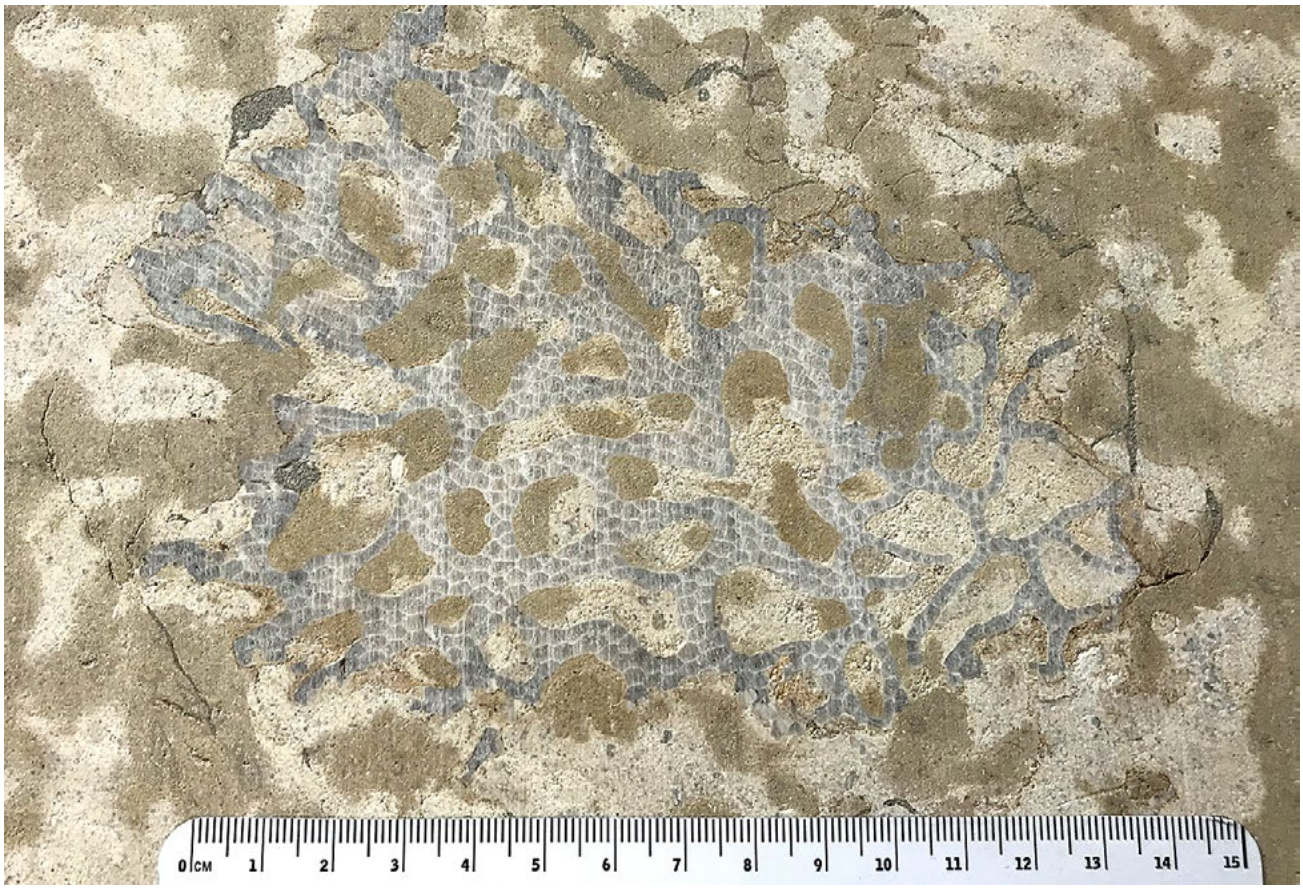

Figure 18. SAIT; Another tabulate "chain coral," this one probably *Manipora*, distinguished from *Catenipora*(?) (Figure 17) by the commonly double or triple-width "chains" of corallites.

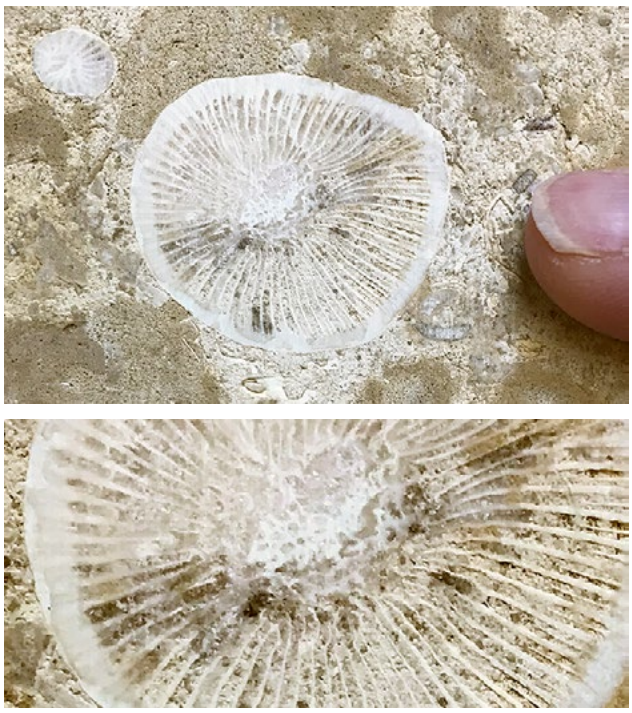

Figure 19. SAIT; two small, solitary rugose corals ("horn corals") in cross section. The smaller individual may be a different species, a younger specimen of the same species, or a mature specimen that was simply cut closer to the tip of the "horn." Lower image is an enlarged detail of the bigger specimen.

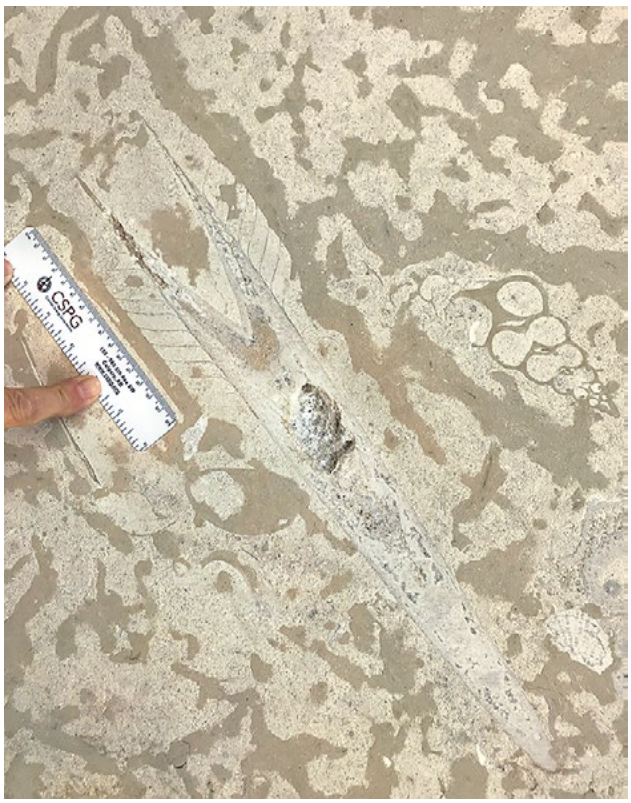

Figure 20. SAIT; a large orthocone nautiloid showing internal structures, length 48 cm. *Hormotoma* gastropod on right.

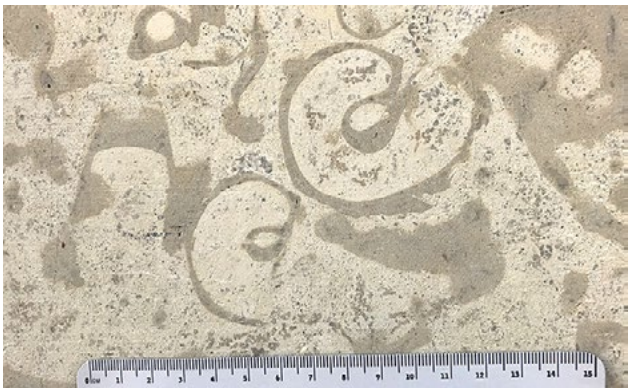

Figure 21. SAIT; a pair of gastropods, cf. *Hormotoma* sp.

Figure 22. SAIT; large orthocone nautiloid, width 20 cm.

Figure 23. SAIT; large orthocone nautiloid, length 50 cm.

Figure 24. SAIT; "*Receptaculites,*" width 20 cm.

Figure 25. SAIT; large, semi-circular (cyrtocone) nautiloid, similar to *Winnipegoceras*, length about 30 cm.

Figure 26. SAIT; "*Receptaculites*," width 15 cm.

Figure 27. SAIT; detail of Figure 24, "*Receptaculites*" cut at right-angles to the surface of the spheroidal skeleton, showing the pillars that separate the inner and outer walls. This is same fossil as Figure 28 but cut at a different angle.

Figure 28. SAIT; detail of Figure 2, "*Receptaculites*" cut nearly parallel to the surface of the spheroidal skeleton. Here the pillars separating the inner and outer wall are visible in cross-section, forming the characteristic "sunflower" pattern.

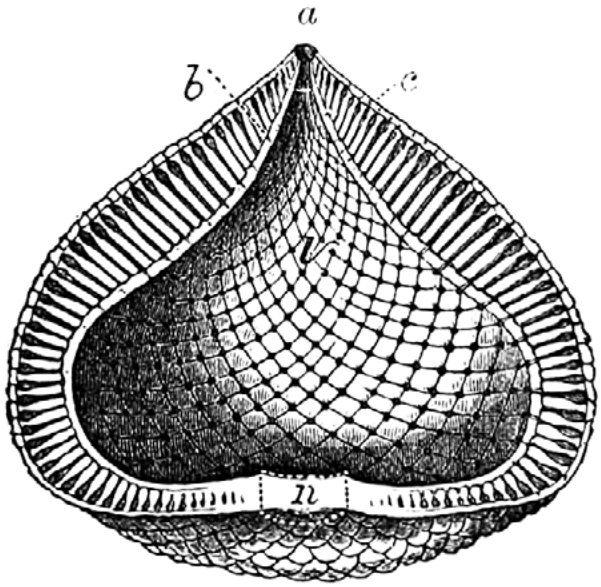

Figure 29. Reconstruction of "*Receptaculites*" from Billings, 1865 (his figure 373, p. 378). a = aperture, b = inner wall, c = outer wall, v = internal cavity. Note pillars (white) between inner and outer walls.

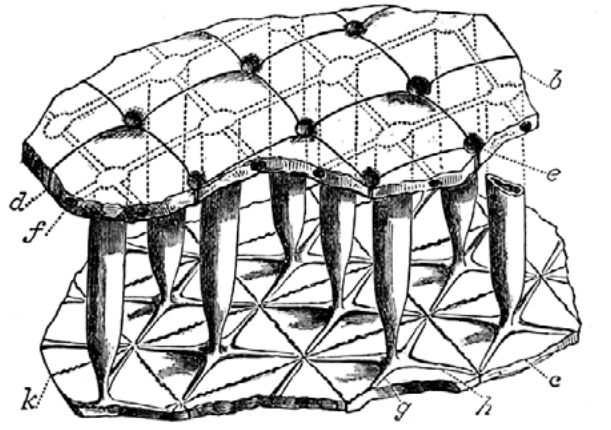

Figure 30. Reconstruction of the wall structure of "*Receptaculites*" from Billings, 1865 (his figure 357, p. 382). The important features to note are the inner (top) and outer walls, supported by pillars, characteristic of this fossil.

Figure 31. SAIT; A large *Maclurina* gastropod (snail).

Acknowledgements

This article is based on the guide to APS field trip 2020-4, held September 12, 2020. I was inspired to organize this trip when I read an article by APS member **Dr. Clint Tippett**, retired Shell Canada geologist and Past President of the Canadian Society of Petroleum Geologists (CSPG) in the CSPG *Reservoir* magazine, November/December 2018 issue. The article was titled *Geology in Your Neighborhood*, wherein he described various fossil localities in Calgary including the fossiliferous Tyndall Stone on the north side of the historic AGT building, downtown.

I owe a big thank-you to **Dr. Brian Pratt**, Professor of Geology at the University of Saskatchewan (Saskatoon), who was more than generous with his time and knowledge in many detailed email discussions, identifying fossils seen in the photographs.

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In addition, I would like to recognize APS member **Dr. Les Eliuk**, retired Shell Canada geologist and carbonate specialist now living in Lunenburg, Nova Scotia, for his recommendation to me to check out the Tyndall Stone fossils at SAIT. I live in the community of Rosedale and live within six streets of SAIT. I have walked many times past the buildings mentioned herein but I had never noticed the many beautiful fossils on the sides of the buildings there. I have had a lifetime interest in palaeontology and have searched for fossils worldwide whenever the opportunity arose. I was flabbergasted to learn that, after having spent a half-century searching for fossils, the most interesting fossils I have discovered in the world are within one kilometre of my backyard!

About the Author

Tako Koning is Holland-born but Canada-raised and has over four decades of experience working as a geologist in the oil industry in Canada and in Indonesia, Nigeria and Angola. He has a B.Sc. in Geology (1971) from the University of Alberta and a B.A. in Economics (1981) from the University of Calgary. Tako is a registered Professional Geologist with the Association of Professional Engineers & Geoscientists of Alberta (APEGA). This is the first time he has led a field trip for APS. He gave a presentation to APS on *Algal Stromatolites: from Precambrian to Present Day* in April, 2019 at Mount Royal University.

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