BEACH SAND MUSING

I recently received an email from a Micscape reader who commented on my insatiable curiosity. He then offered to send me samples of sands from around the world. They were collected during his years of travels, with sands from Scotland to Cuba, South Africa to Arizona, and Hawaii to the Bahamas. So I paid for the postage and received a wonderful and fascinating collection to add to what I have already collected. Thank you Fritz!

One of the first that I examined with the binocular was the sample from Cuba.

Sand from Cuba photographed at 2x

Not surprisingly, it contained a large amount of living (or formally living) elements, like forams, nummulite, bits of coral and shells, and broken sea urchin spines.

I also found a few tiny shells that may or may not be actual baby snails.

Sand from many tropical beaches will often be made mostly of these living elements.

The same sample at 10x

A “baby snail” on a needle tip, at about 20x

Nummulite and possible baby snails

Broken pieces of sea urchin spines

Nummulite 20x

Nummulite 20x

The nummulites are particularly interesting. It's amazing to find these delicate and seemingly fragile structures mixed within the coarse sand.

Nummulite 20x

A baby snail? 20x

Sand from Cape Town at 2x

But being in the tropics does not necessarily mean a lot of biological source for the sand. Another sample I received from Fritz was from a beach in Cape Town, in South Africa. Cape Town is bathed by a cold Atlantic current and its sand is mostly mineral. I spotted very few forams and most of the sand is made of mineral grains.

Looking at Fritz's samples raised my curiosity about the sand already in my collection. I had the opportunity to go to Costa Rica on two occasions, both times on the Pacific Coast. While it's definitely tropical, both regions were pretty far from coral reefs. I found their sands to contain lots of grounded pieces of shells and plenty of sea urchins spines. I do believe that some of the mineral, mainly pink in color, does come from coral that can be found further down on the coast.

One thing that I found in those samples was transparent and oddly shaped grains that may very well be pulverized pieces of glass. It could be quartz, but I find the cleavage too random and angular. That said, I could be wrong…

Sand from Costa Rica at 2x

Bits of broken glass? 2x

Playa Ventana

The sand of Buena Vista Beach at 5x

Another beach further north, near Samara, was rockier, more exposed to crashing waves, and possibly with less coral off-shore. Consequently, its sand appears to be made mostly of minerals with less organic elements.

The rocky shore pounded by the waves

The long beach of Buena Vista

Black volcanic sand from Hawaii, 5x

Another tropical sample I received from Fritz was from Hawaii, more specifically, from the famous black volcanic sand. At first sight, it does look black, but under the microscope, the sand does show some color, mainly green specks. Fritz thought this was jade, but it's actually olivine, a common mineral that crystalize in magma. When the crystals are big enough, they can be cut in a semi-precious gemstone known as peridot. Papakolea Beach in Hawaii is made mostly of olivine. As for the back grains, they're made of basalt.

Olivine in volcanic sand, 20x

Bits of coral with olivine and basalt, 10x

Hawaii is also known for its coral reefs, so it's not surprising that some grains of sand turn out to be white bits of grounded coral; other bits may also come from broken sea shells.

Beach sand from the Bahamas, 10x

One last sample from Fritz was from the Bahamas. Just looking at it makes me wish that I could walk over it barefoot… It's very fine and the grains are of an even size. It was described as "Precipitated carbonate calcium". Of course, that piqued my curiosity and I had to learn more about it. In a web page (https://www.calcean.com/oolitic-aragonite) I found the following:

"The phenomenon in which oolitic aragonite is formed is described as a "Whitings" event. Thought to be schools of fish disturbing the sandy bottom of the Bahama banks, "Whitings" are actually epicellular precipitation of calcium carbonate induced by photosynthesis in blooms of Picoplankton, predominantly cyanobacteria, that seasonally enter the shallow waters throughout the Bahamas. In addition this photosynthesis and calcification process sequesters tens of thousands of tons of carbon dioxide from our environment. Oolitic aragonite not only makes a cleaner environment in its generative process but also has the potential of helping to clean up the environment through its use in various industries, like plastics."

So in this case, there is more to grains of sand than the usual erosion of rocky shores or grounding of living organisms…

A search for "sand" in Micscape also led me to a wonderful article written more than 20 years ago:

http://www.microscopy-uk.org.uk/mag/indexmag.html?http://www.microscopy-uk.org.uk/mag/artjun01/clsand.html

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