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Tapping, Ken

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UNDER A PINK SKY

Ken Tapping, 28th October, 2014

Some months ago I had a bit of fun with a geologist friend. I sent him an image of an arid landscape, with rounded red hills in the background, in which rock layers were clearly visible. He sent me back a message pointing out deposits of waterborne materials and sediments, and summarized the history of that landscape. There were times when vigorously flowing water covered the land, and other times where the water was more placid. It was fascinating. I never pointed out to him until afterwards that the image showed a landscape on Mars. It had been taken by the Curiosity rover, now exploring the planet.

It is currently believed that Mars started to dry out about three billion years ago. Assuming that Mars and Earth formed at the same time, it is likely that back then the two planets were at similar stages in their development. At that time our oceans were teeming with early forms of life. It is possible that Mars also had primitive creatures swimming in its oceans. However, from then on things changed. Mars started to lose its atmosphere and dry out. Today the only water we have found is in the form of buried deposits of ice, thin, seasonal polar ice caps, and an occasional overnight frost that forms on the rocks, vanishing when the Sun comes up.

We have long known that the Martian atmosphere is very thin, with a ground level pressure less than 1% of the pressure at sea level on our planet. Those pressures are what we find in the Earth's upper stratosphere. Up there the sky is a dark blue-violet. So until we landed something on the surface of Mars, textbooks and science fiction books had illustrations showing Mars with a dark blue sky. The logic was reasonable, which made it more surprising to find we were wrong. When the Viking spacecraft landed on the surface of the Red Planet, and the first colour images reached Earth, they showed the Martian sky is not blue; it is pink.

Even though there the Martian atmosphere is thin, it is highly dynamic. There are wind storms that whip up dust storms lasting months and covering vast areas of the planet, and dust devils wandering around. The blowing dust particles erode the hills and rock outcrops, releasing more dust, and the dust particles crash together making them finer and more rounded. Some of that dust is so fine it floats around the Martian lower atmosphere.

The red colour of rocks and soils on Mars and on Earth are due to the presence of iron oxide – rust. It is produced by the action of water on iron-bearing minerals in rocks. The fact that Mars is a red planet is evidence there was once a lot of water there. That's why the Moon's surface is not red; that world has been vacuum dried for billions of years. Very fine particles of iron oxide floating in the atmosphere make the Martian sky pink.

The story my geologist friend decoded from that rock outcrop is a sad one. Three billion years ago the story of life on Earth had just started. On Mars it was about to end. Maybe there are fossils of ancient Martian life in the rocks in that image. It would be great to go there to look for them.

One of the theories as to what happened to Mars is based upon the planet having no global magnetic field. Flows of molten metal in the Earth's core give our world a global magnetic field that extends far out into space. This keeps the solar wind well away from our planet's atmosphere. However, Mars is a smaller world than ours, and cooled a lot faster. When its core solidified the mechanism generating the Red Planet's magnetic field stopped, and the magnetic protection from the solar wind collapsed. This allowed the solar wind to slowly scour away the planet's atmosphere. With no atmospheric greenhouse effect the planet froze, leaving the cold, almost airless planet we see today: red hills and deserts, under a pink sky.

Jupiter rises soon after midnight. Mars lies low in the sunset glow. Mercury lies very low in the dawn sky. The Moon reaches First Quarter on the 30th.

Ken Tapping is an astronomer with the National Research Council's Dominion Radio Astrophysical Observatory, Penticton, BC, V2A 6J9.

Tel (250) 497-2300, Fax (250) 497-2355

E-mail: ken.tapping@nrc-cnrc.gc.ca