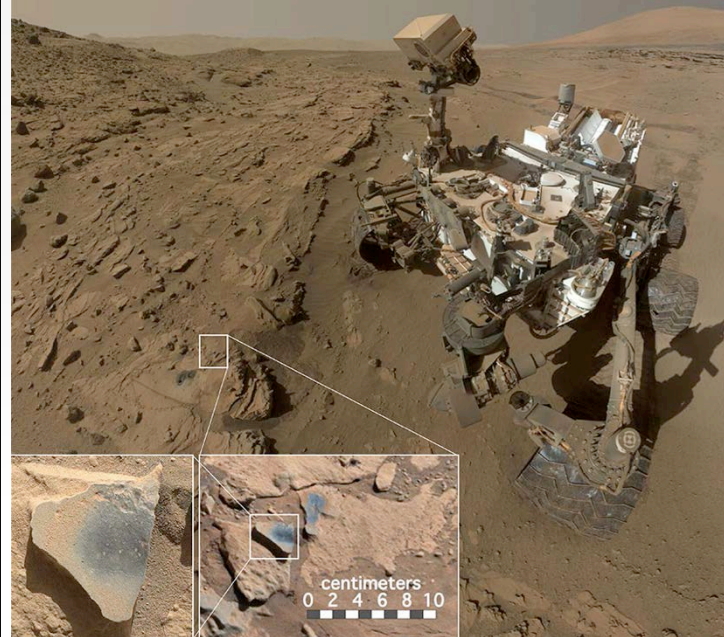


# Manganese and Mars' Earth-Like Past

Curiosity at Windjana in the Kimberley region, with the ChemCam laser targets seen in the less-dusty grey spots.



**The Curiosity rover has identified manganese oxides in Martian rocks, indicating that in the past, Mars may have had more atmospheric oxygen.**

- High Mn minerals were measured in materials that formed within fractures in sandstones in the Kimberley formation in Gale Crater by ChemCam laser-induced breakdown spectroscopy (LIBS). The morphology of these features indicate that they formed after the sandstone had cemented and was subject to later fracturing and groundwater fluid flow, but that they were not the result of recent surface processes.
- The formation of these oxides would have required highly oxidizing conditions in the martian groundwater, the most likely *cause of which would be contact with the atmosphere which had significant oxygen content*.

- The measurement of manganese oxides in Gale Crater is complemented by the discovery of similar minerals by the Opportunity Rover at Meridiani, a site nearly half the planet distant, *suggesting that these conditions were global*.
- Atmospheric oxygen on the Earth is the result of the activity of photosynthetic organisms, on Mars the activity of similar organisms may be the source of this oxygen, or it may have come from the breakdown of water.