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## **Mars Exploration Rover's image analysis: Evidence of Microbialites on Mars.**

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The Mars Exploration Rovers, Opportunity and Spirit, investigated Martian plains, where sedimentary rocks are present. The Mars Exploration Rover's Athena morphological investigation showed microstructures organized in intertwined filaments of microspherules: a texture we have also found on samples of terrestrial (biogenic) stromatolites and other microbialites. We performed a quantitative image analysis to compare images of microbialites with the images photographed by the Rovers (corresponding, approximately, to 25,000/25,000 microstructures, Earth/Mars). Contours were extracted and morphometric indexes were obtained: geometric and algorithmic complexities, entropy, tortuosity, minimum and maximum diameters. Terrestrial and Martian textures present a multifractal aspect. Mean values and confidence intervals from the Martian images overlapped perfectly with those from the terrestrial samples. The probability of this occurring by chance is  $1/28$ , less than  $p < 0.004$ . Terrestrial abiogenic pseudostromatolites showed a simple fractal structure and different morphometric values from those of the terrestrial biogenic stromatolite images or Martian images with a less ordered texture ( $p < 0.001$ ). Our work shows the presumptive evidence of microbialites in the Martian outcroppings: the presence of unicellular life widespread on the ancient Mars.