Planetary Protection and Solar System Exploration

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And scattered about... were the Martians—dead!—slain by the putrefactive and disease bacteria against which their systems were unprepared; slain as the red weed was being slain; slain, after all man's devices had failed, by the humblest things that God, in his wisdom, has put upon this earth.

...By virtue of this natural selection of our kind we have developed resisting power; to no germs do we succumb without a struggle...
Astrobiology Science Goals

• Understand the origins, distribution, and future of life in the universe
Life Affects the Evolution of Planets

Evolution of Earth's Early Environment

- Solar luminosity: 70, 76, 83, 90, 95%
- Meteorite impacts: Size and frequency
- Heat flow: 20, 10, 0 \(10^{-6}\) joules/cm\(^2\) sec
- Continental stabilization: Major orogenies
- Atm. \([O_2]\): 0%, 35%
- Oceanic \(O_2\) Rise
- Banded Iron Formations

Age, Ga: 4.5, 3.5, 2.5, 1.5, 0.5 Ga
Planetary Protection Mission Constraints

- Depend on the nature of the mission and on the target planet
- Assignment of categories for each specific mission/body takes into account current scientific knowledge based on recommendations from advisory groups (COSPAR, Agency)

Specific measures could include:
- Documentation of trajectories and materials inventory
- Organic/microbial archive and restrictions
- Constraints on operating procedures
- Reduction/monitoring of biological contamination
- Restrictions on the handling of returned samples
The Basic Rationale for Planetary Protection Precautions
(as written by Bart Simpson, Dec. 17, 2000, “Skinner’s Sense of Snow”)

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