Survivor! (??)
The story of *S. mitis* on the Moon

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Introduction: A bug’s tale...

Chapter 1: Microbes, sterilization, and lunar quarantine

Chapter 2: Surveyor III goes to the Moon, Apollo 12 follows

Chapter 3: Survivor(s) on the Moon?

Chapter 4: How a claim became a fact

Chapter 5: Contesting the claim

Chapter 6: For the record...S. mitis – survivor or interloper?

Conclusions: Why should we care about this story?
Chapter 1:

Microbes, sterilization, and lunar quarantine
Meet *Streptococcus mitis*...
LRL’s Surveyor III analysis

they are wearing masks and head caps.
Chapter 2:

Surveyor III goes to the moon, Apollo 12 follows
Surveyor III lands in the Ocean of Storms
Apollo XII Returned to the Earth

24 November 1969 – 600 km East of Pago Pago
Chapter 3:

Survivor(s) on the Moon?
LSC, 1971, Houston:

Mitchell and Ellis: “Surveyor III: bacterium isolated from lunar-retrieved TV camera”

Knittel, Favero, and Green: “Microbial sampling of returned Surveyor III electrical cabling”

Both papers published in 1971 LSC Proceedings and Analysis of Surveyor 3 material and photographs returned by Apollo 12 NASA, 1972)
Apollo 12’s Pete Conrad with the Surveyor III camera
Surveyor III camera, retrieved and in the lab

OUTER SURFACES WERE ORIGINALLY AS WHITE AS BORDER. DISCOLORATION IS DUE IN PART TO STRONGLY ADHERING FINE MOON DUST.
Chapter 4:

How a claim became a fact

“Various components of the American Surveyor III spacecraft, which had resided on the moon for 2.5 yr, were returned during the Apollo 12 mission and analyzed for the presence of viable microorganisms.... Except for the presence of *Streptococcus mitis*, which was considered by the investigators to have been deeply embedded within the camera body before it left the Earth, no viable microbes were recovered from any of the tested components.”


Mitchell & Ellis claim reported as fact in NASA fact sheets, Wikipedia entries, Web sites ranging from credible to dubious....
Chapter 5:

Contesting the claim

(Refuting the “fact” with visual evidence)
1998-2006: NASA PPO J. Rummel pokes around; L. Billings assists

2006-2011: Rummel, Allston, & Morrison keep poking around

2004 Astrobiology Science Conference: “Strep, lies (?) and 16mm film: Did S. mitis survive on the Moon? Should humans be allowed on Mars?” (J. Rummel)

Surveyor III assay, 1970...
Chapter 6:

For the record... *S. mitis* – lunar survivor or post-flight interloper?
Surveyor III camera assay
Conclusions:

Why should we care about this story?

* Astrobiology
  * Planetary protection
  * History and sociology of science
Planetary protection
A picture’s worth a thousand words...

Surveyor III Camera assay, January 1970

Planetary protection final assay, Pathfinder, December 1996

Genesis clean-room wear, June 2001
Astrobiology
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