

Growing Insight into Space Plants are Enablers of Extraterrestrial Exploration

NATIONAL
ACADEMIES

*Sciences
Engineering
Medicine*

SPACE SCIENCE WEEK

20 March 2024

Anna-Lisa Paul

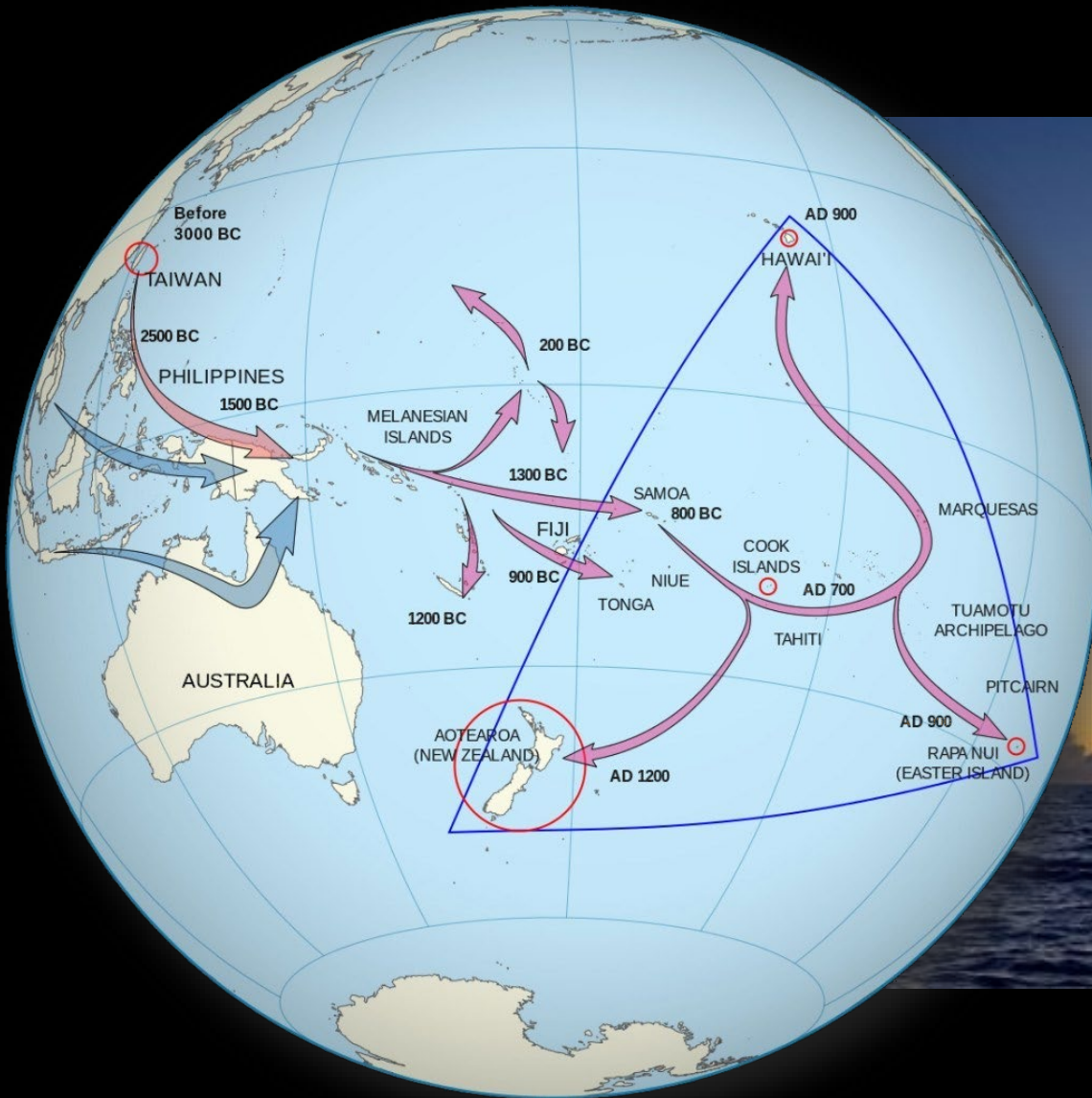
UF UNIVERSITY of
FLORIDA

- Interdisciplinary Center for Biotechnology Research
- Department of Horticultural Sciences
- UF Space Plants Laboratory

<https://hos.ifas.ufl.edu/spaceplantslab/>
A-L Paul & R.J. Ferl

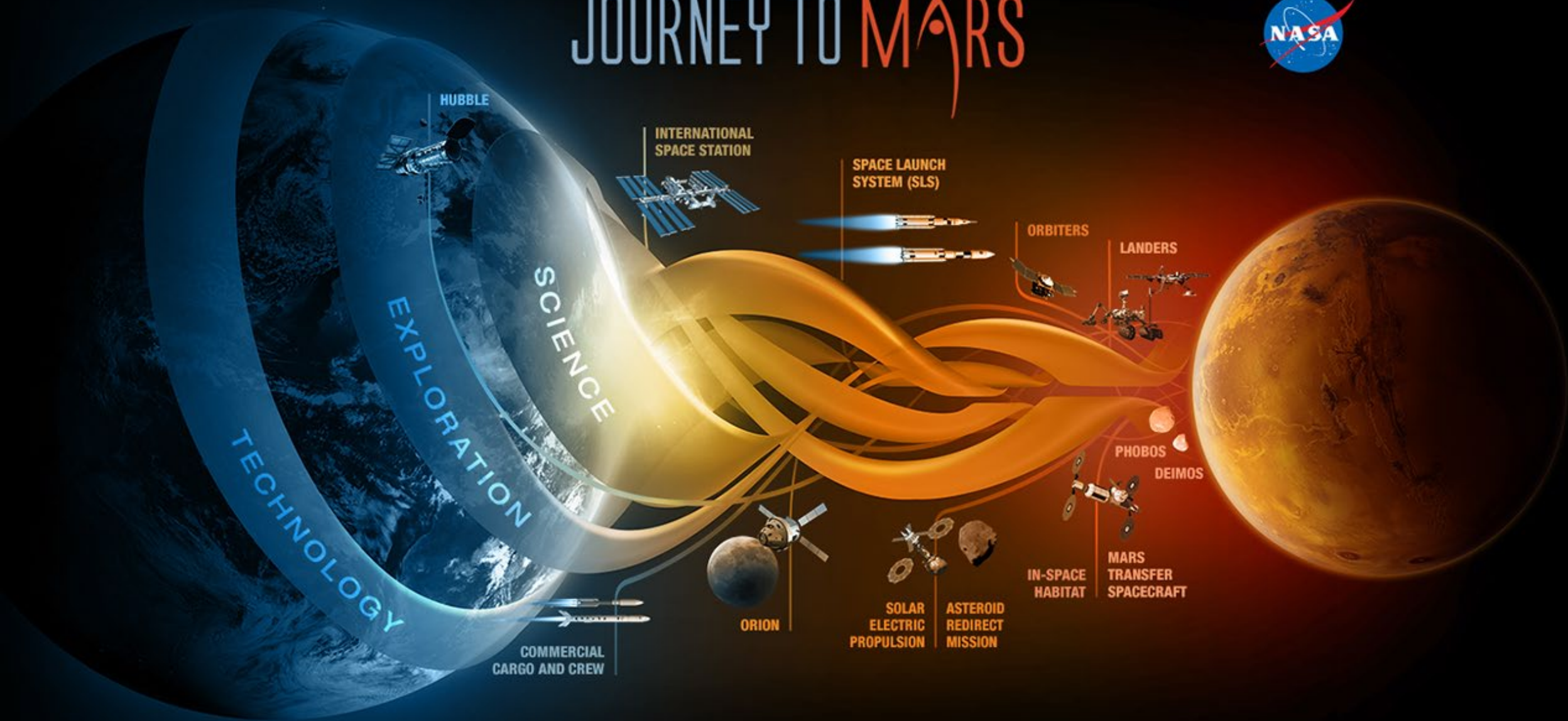


Humans are Explorers



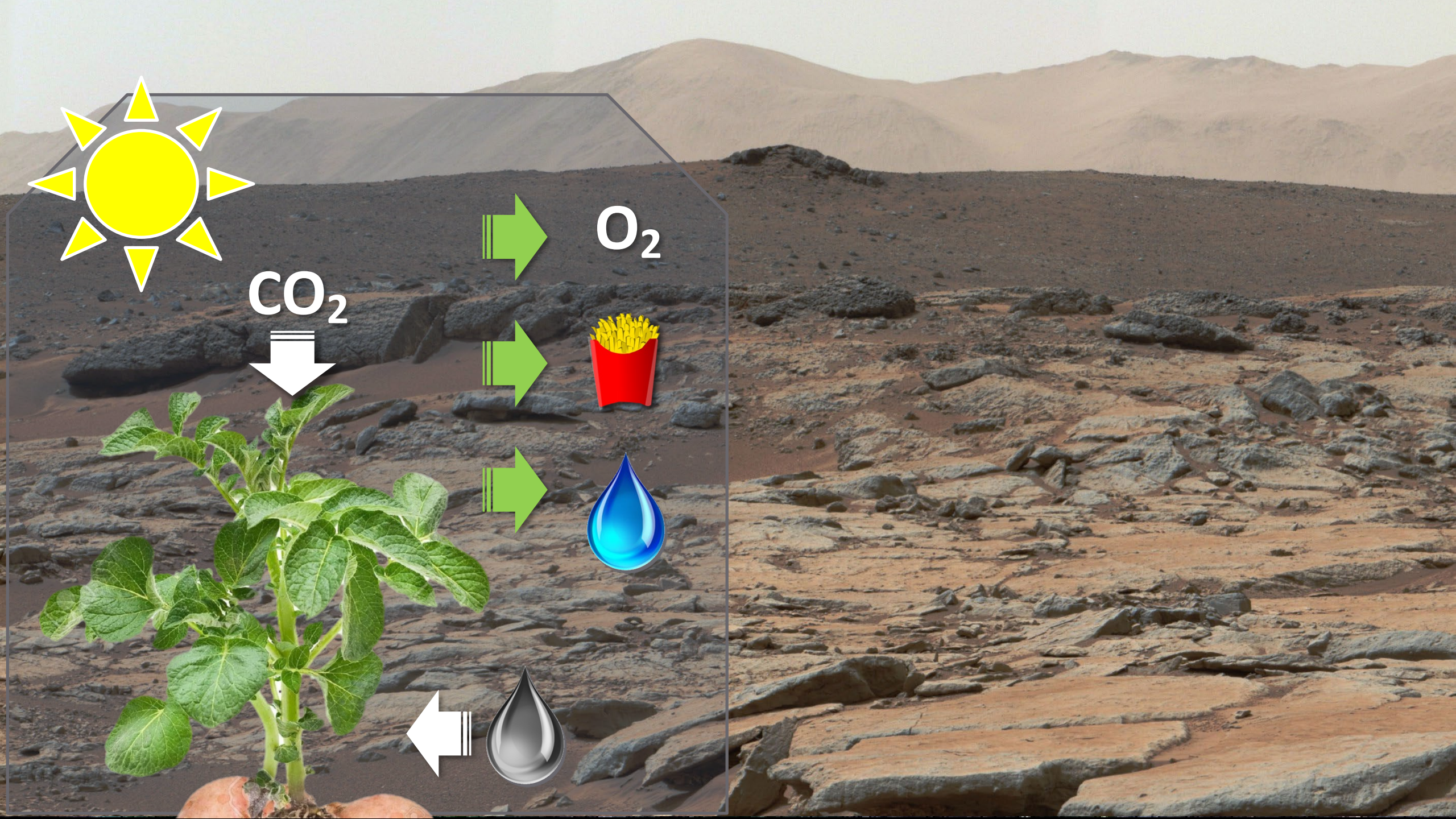


JOURNEY TO MARS







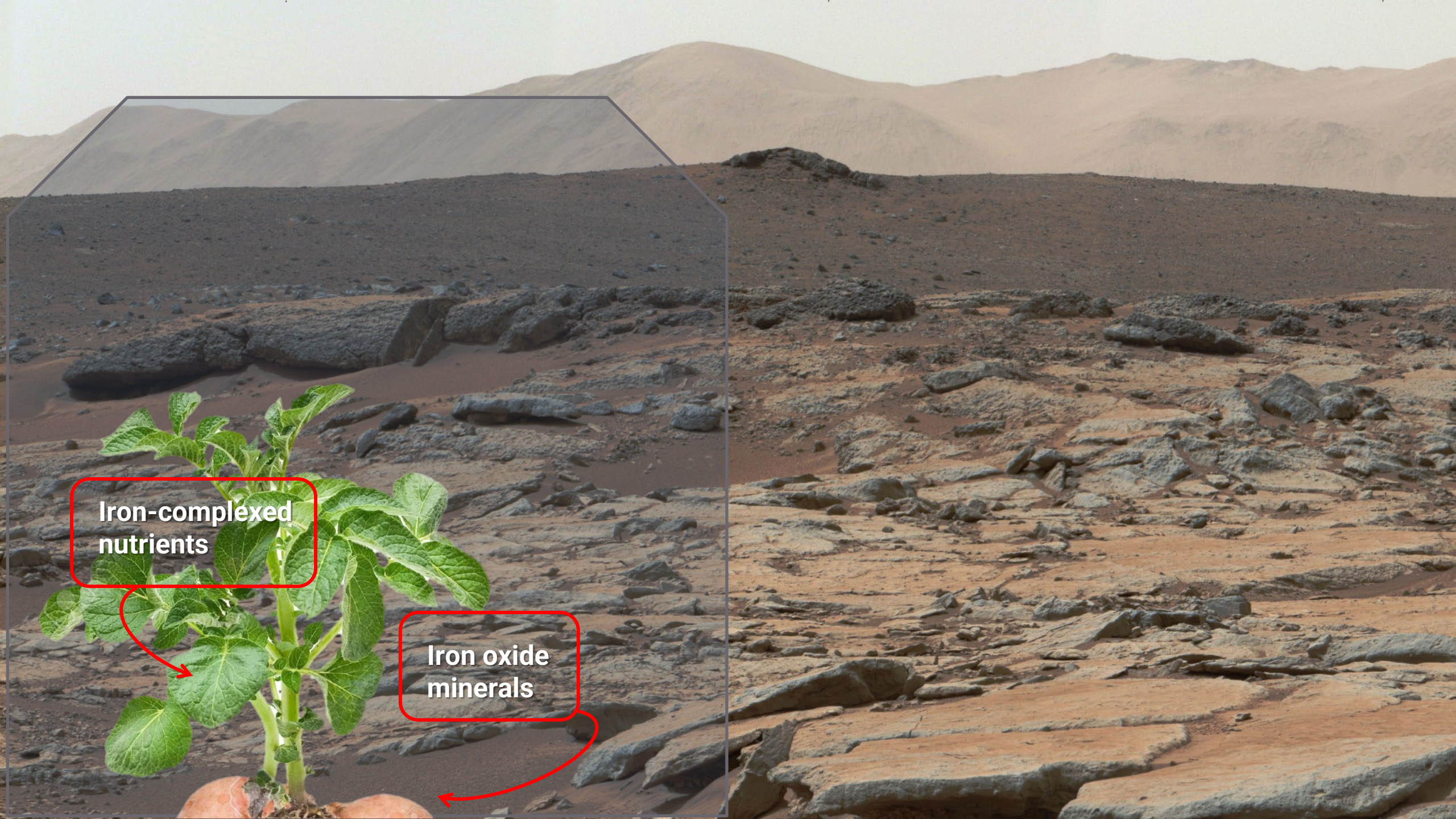


CO_2



O_2





**Iron-complexed
nutrients**

**Iron oxide
minerals**



Journey and Destination





"Fram in the Ice" by W. Gilkerson





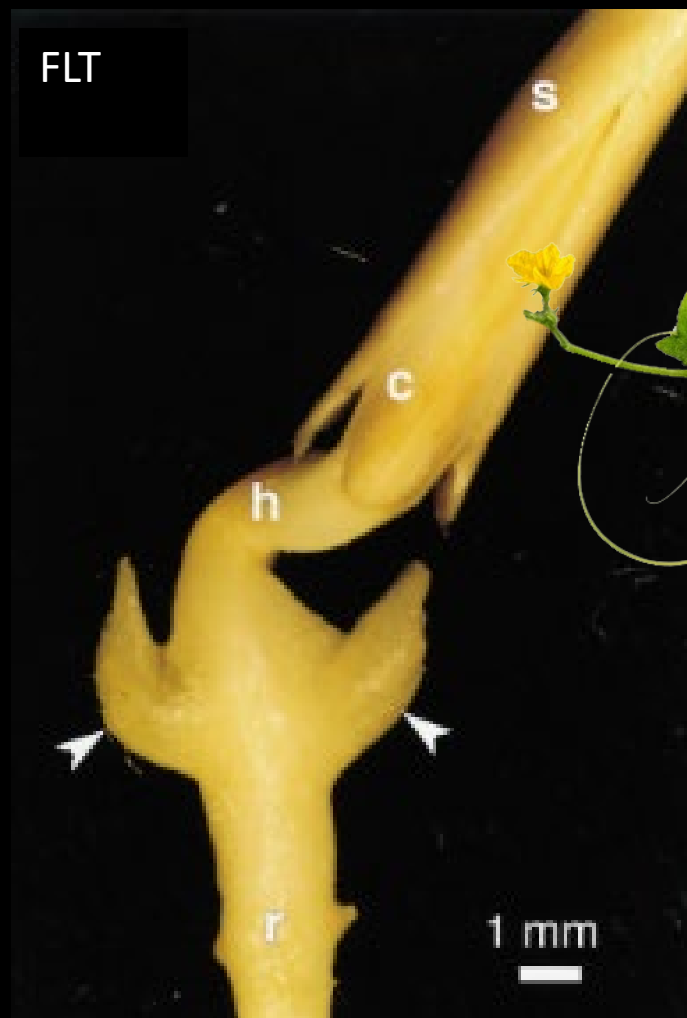
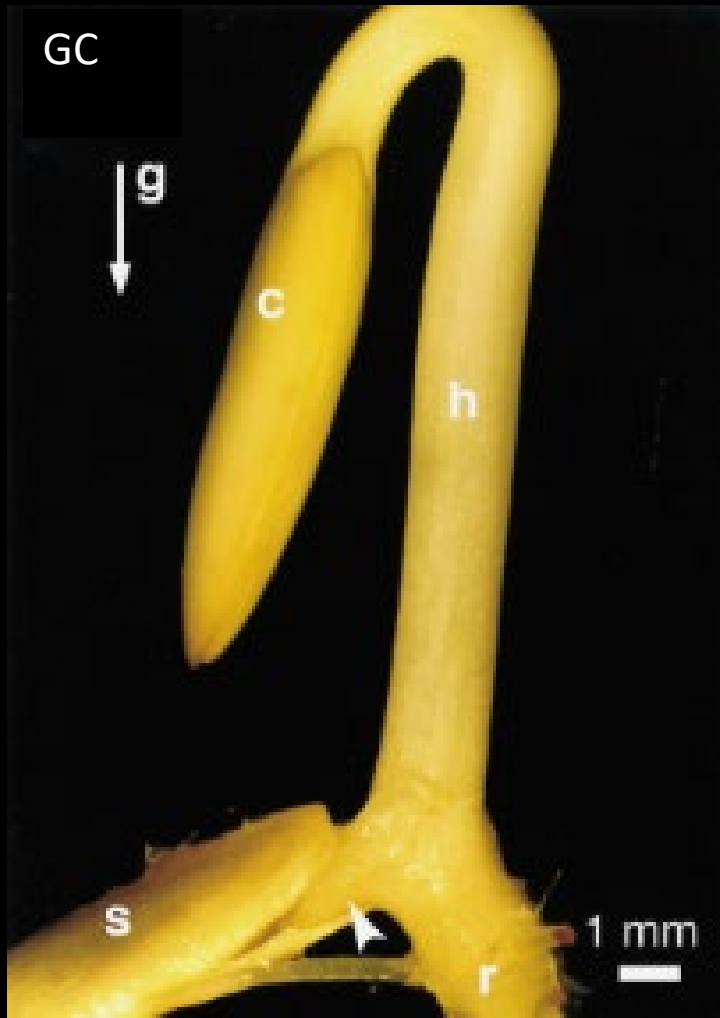


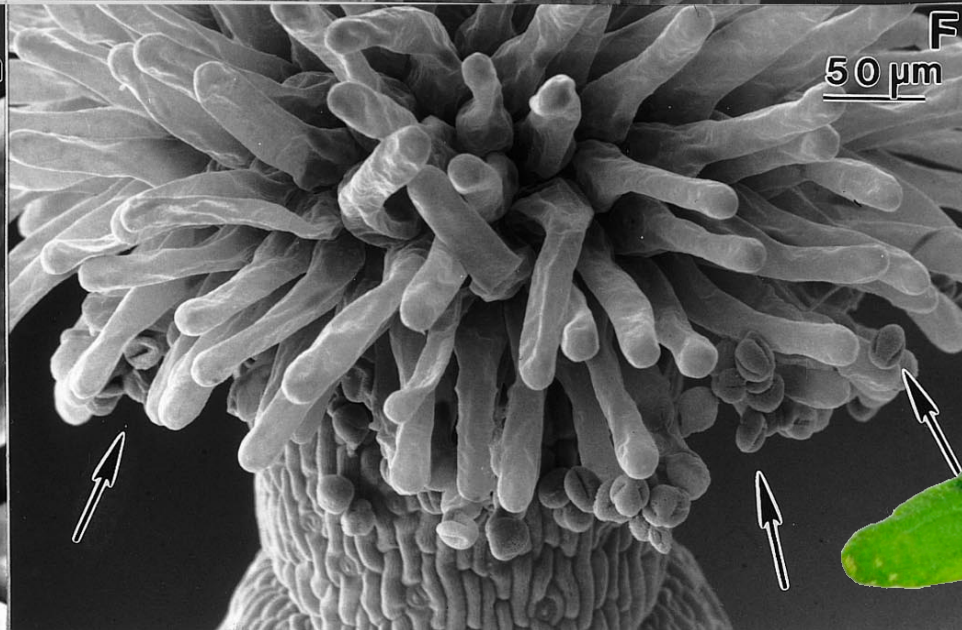
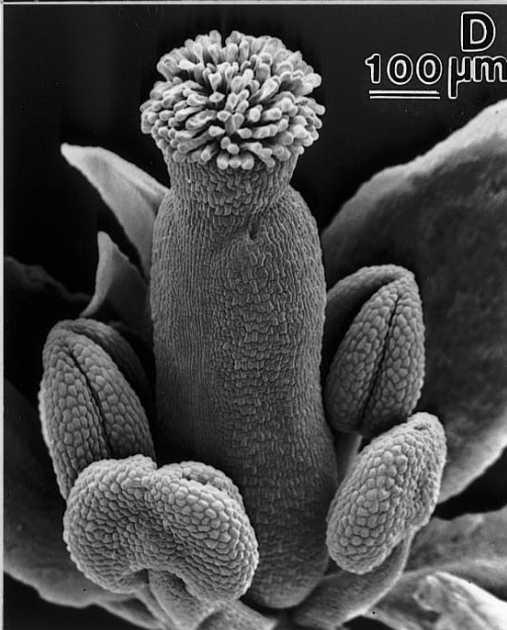
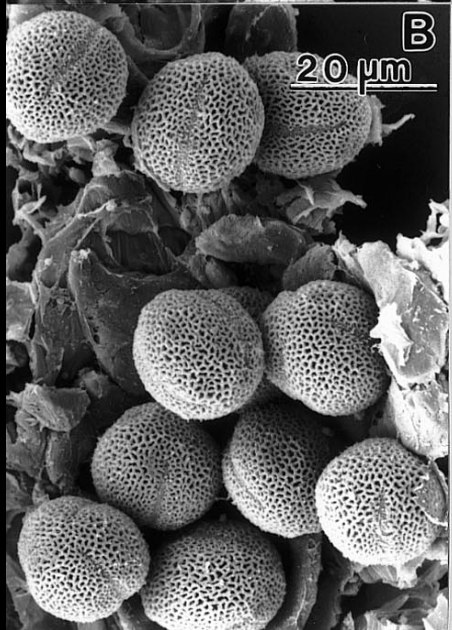
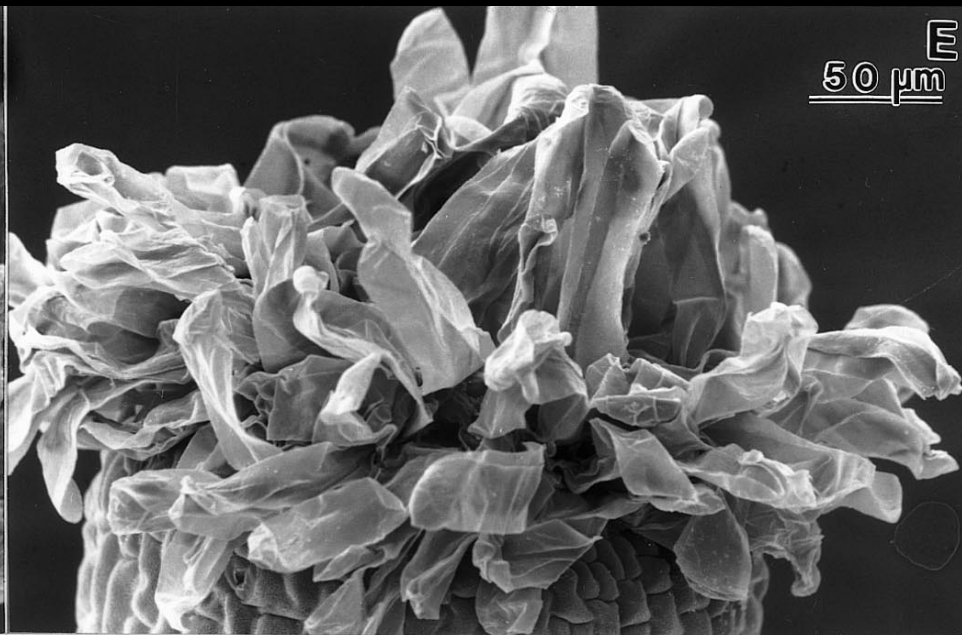
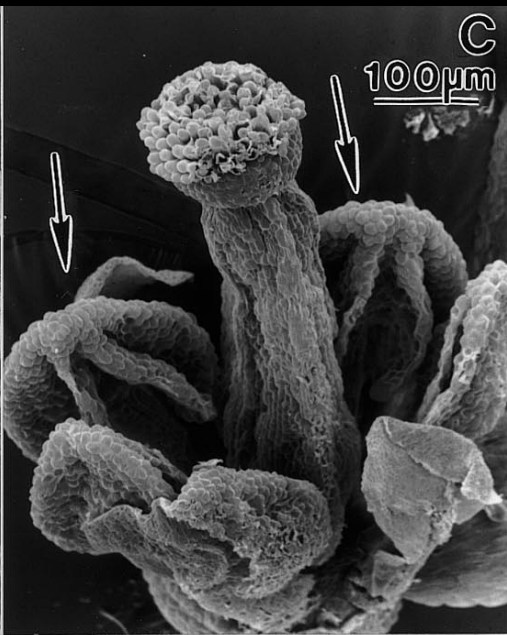
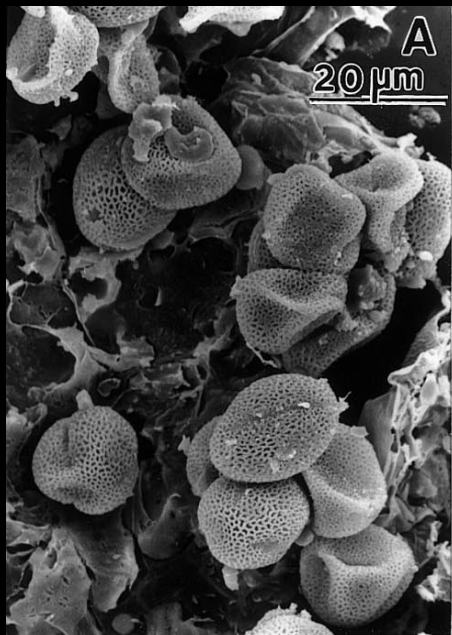
Arabidopsis thaliana



Plants joined humans in the very earliest space missions



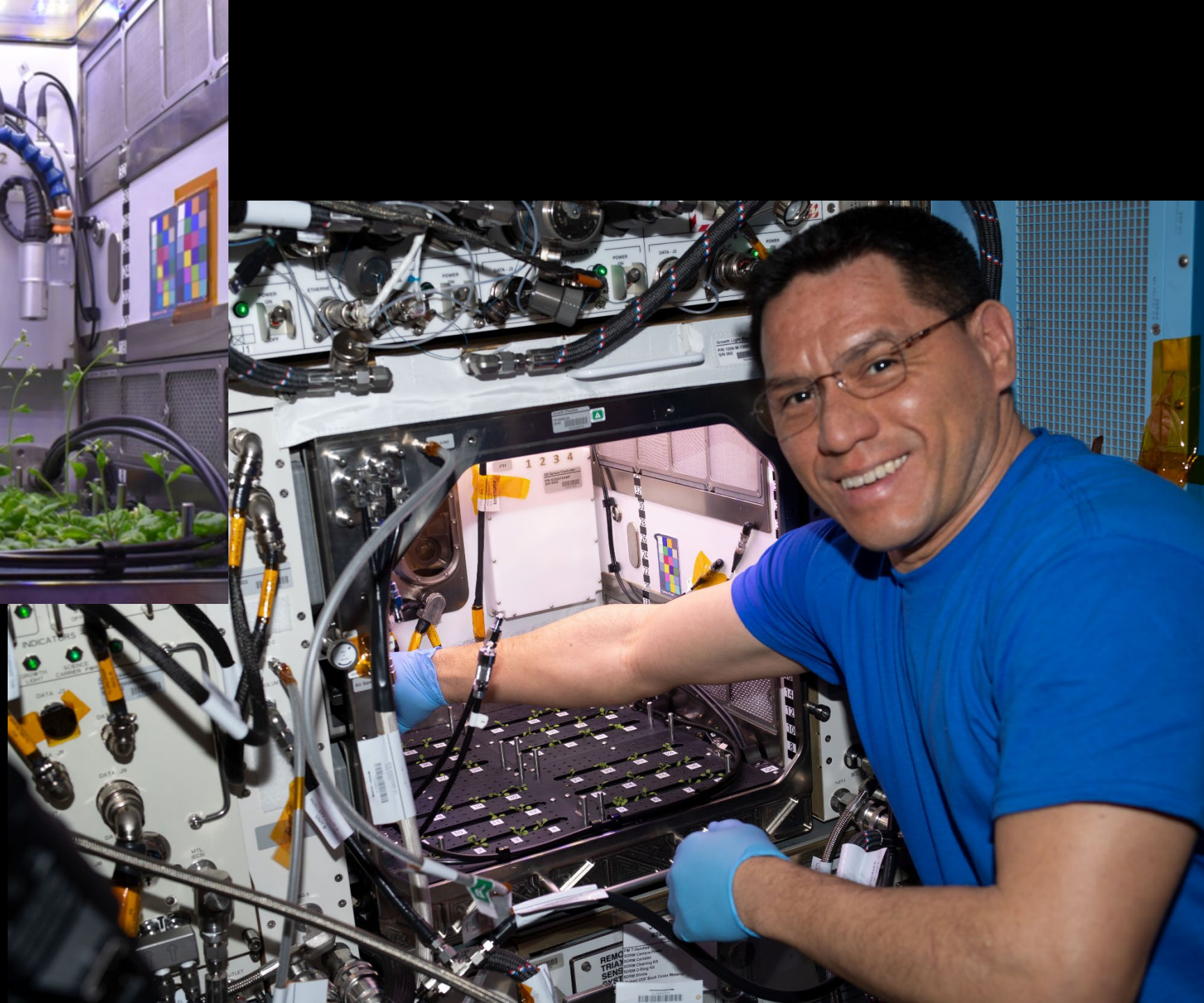


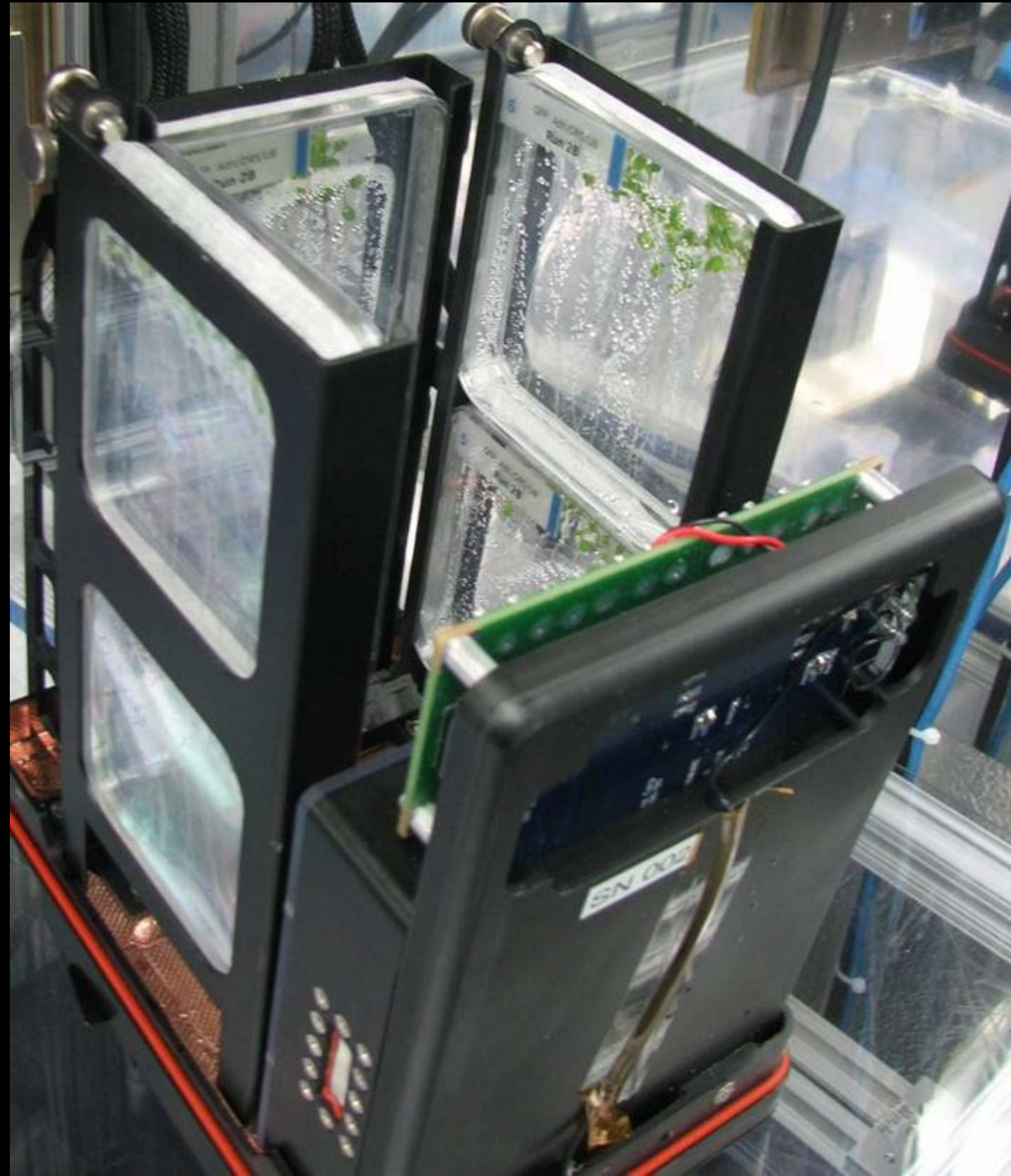


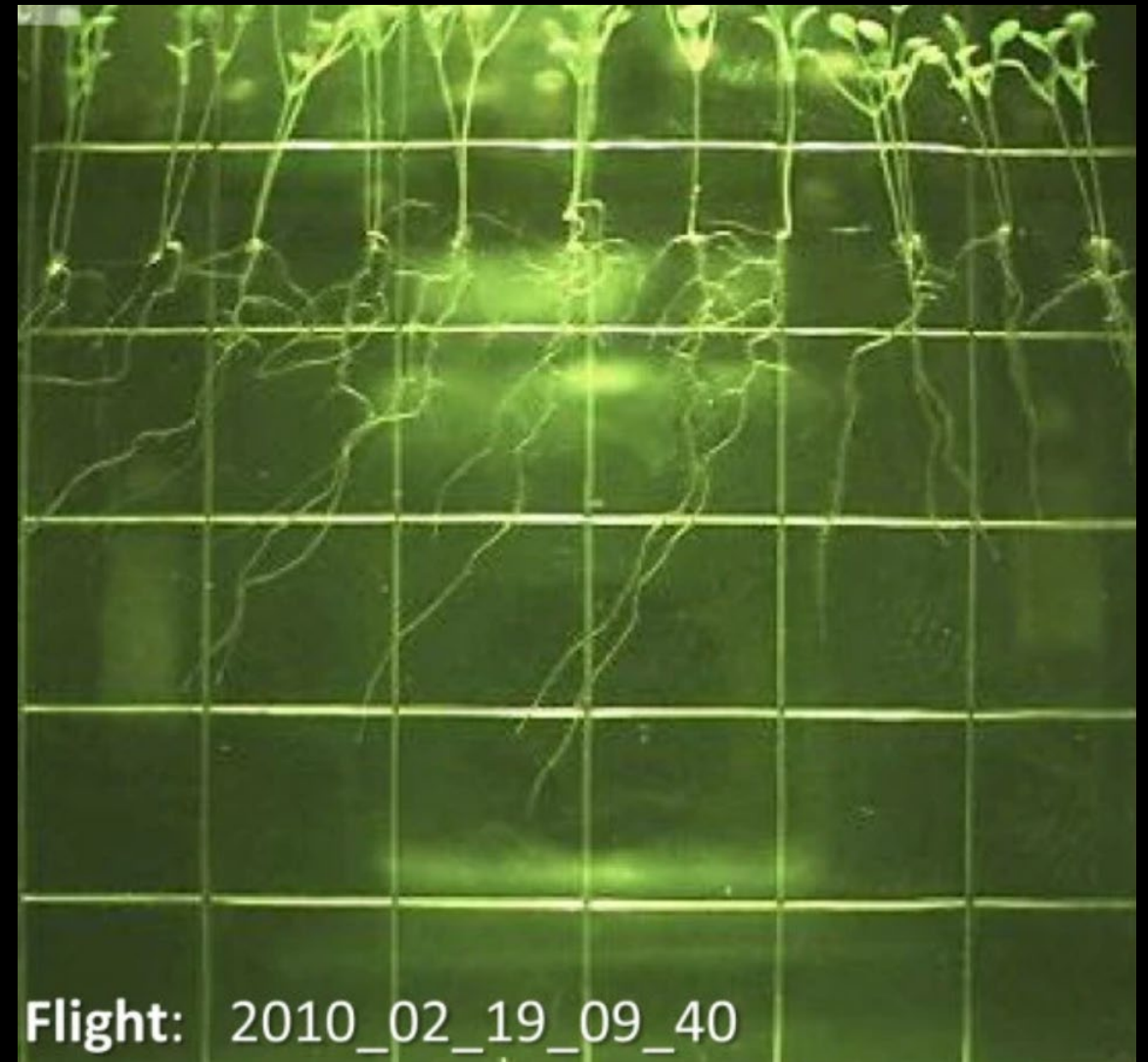
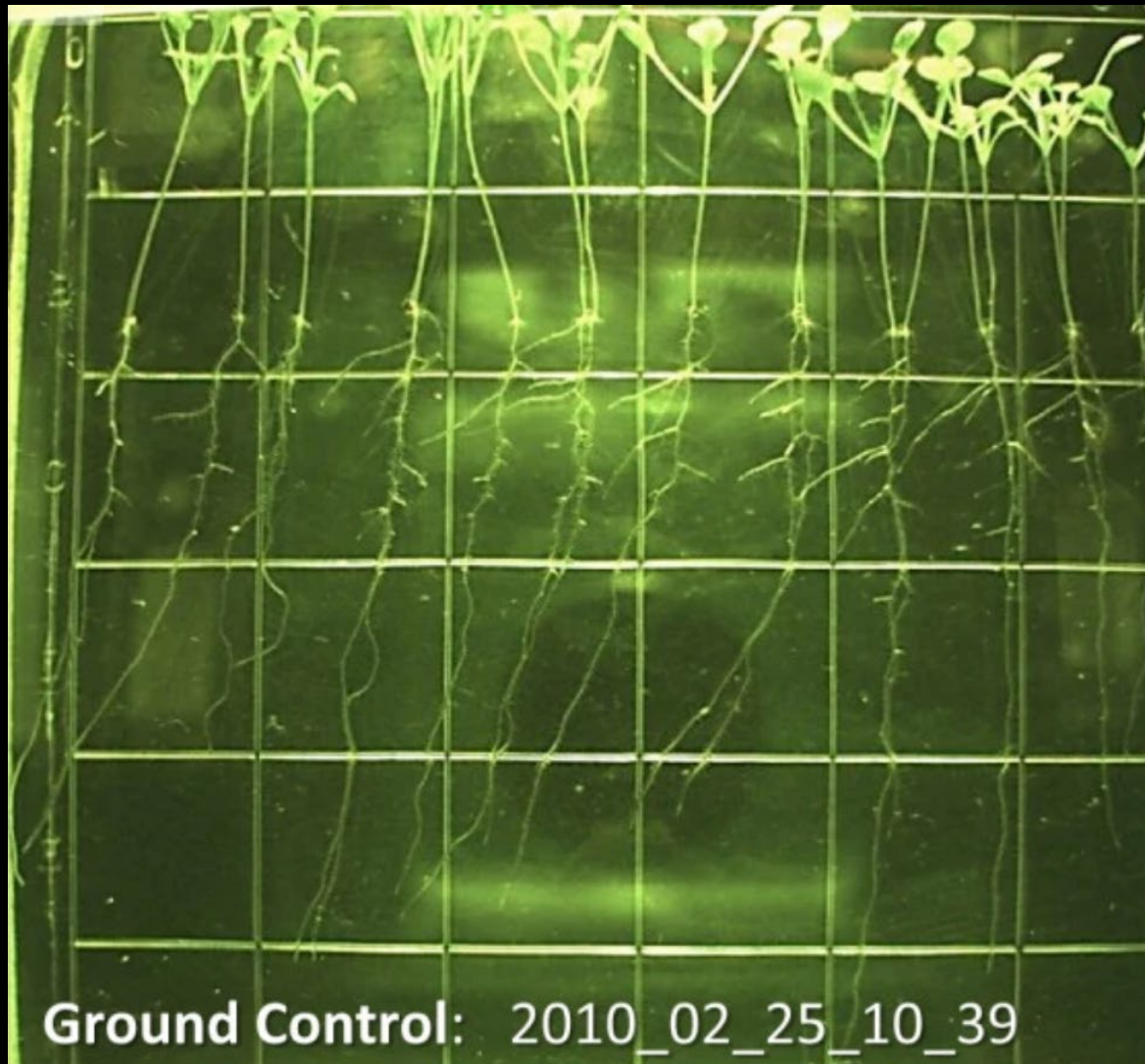
Astronaut Shannon Lucid
observing wheat growing in
the SVET greenhouse on
space station MIR, 1996







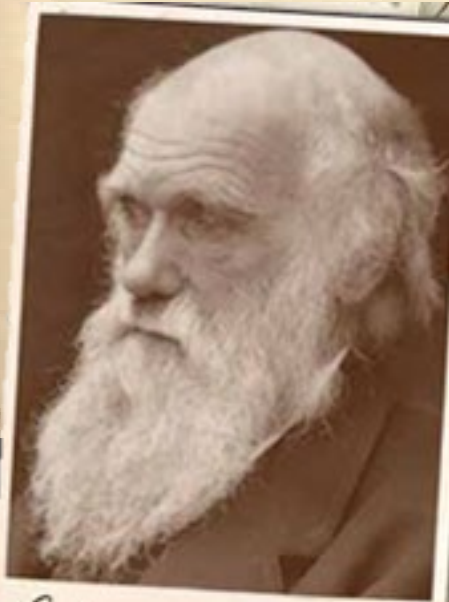




THE
POWER OF MOVEMENT
IN
PLANTS.

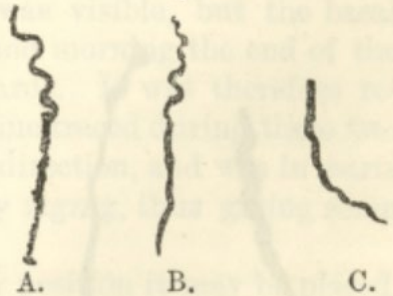
By CHARLES DARWIN, LL.D., F.R.S.

EDITED BY
FRANCIS DARWIN.

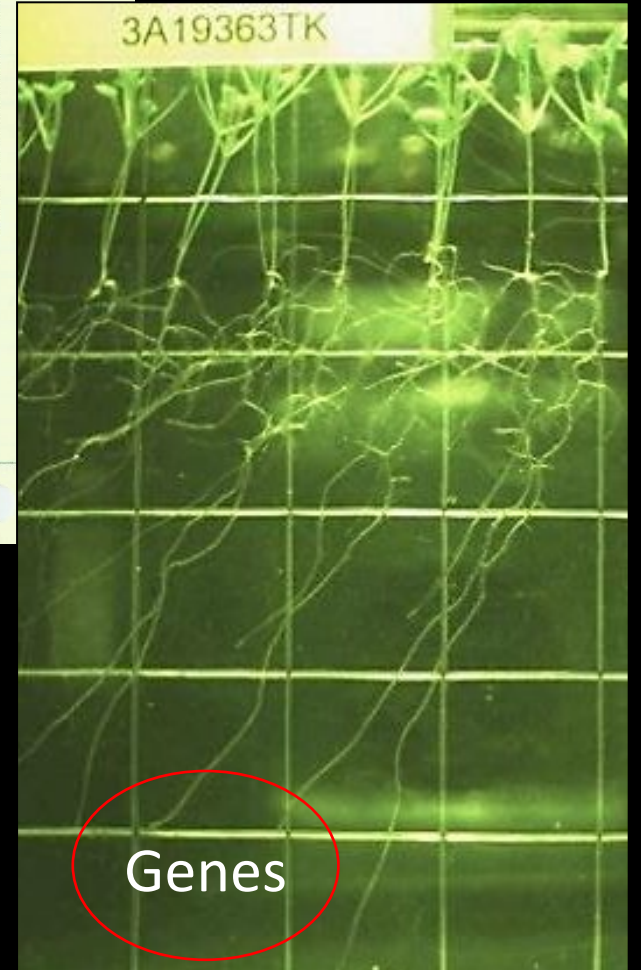
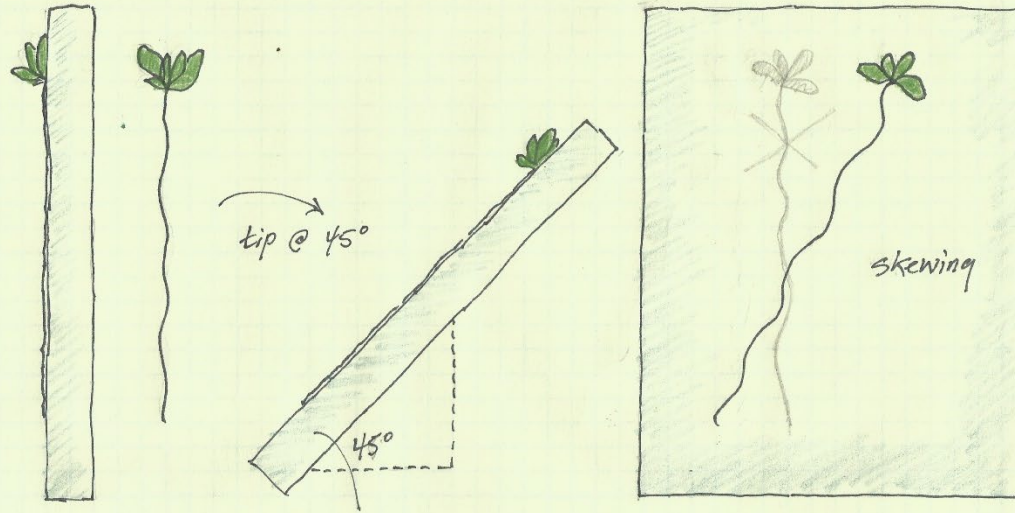


Charles Darwin

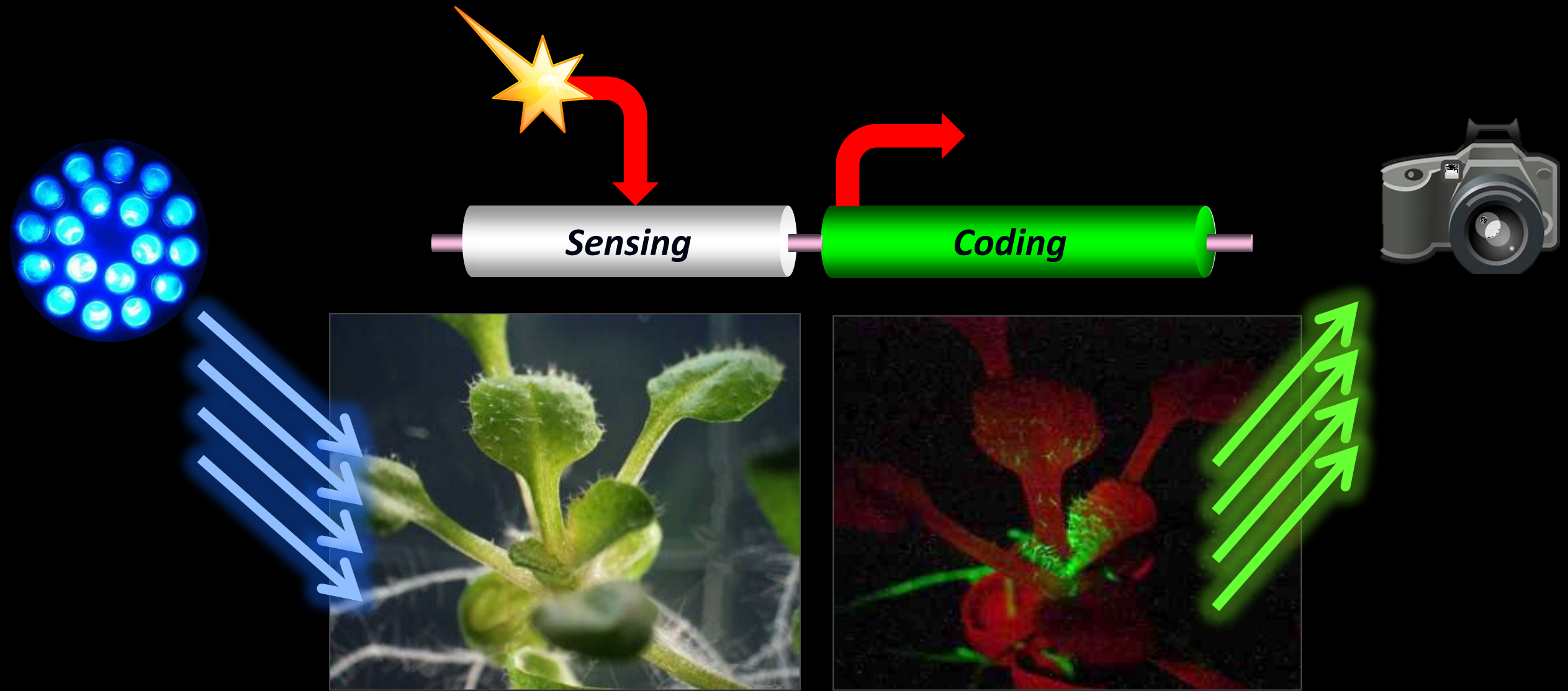
Fig. 19.

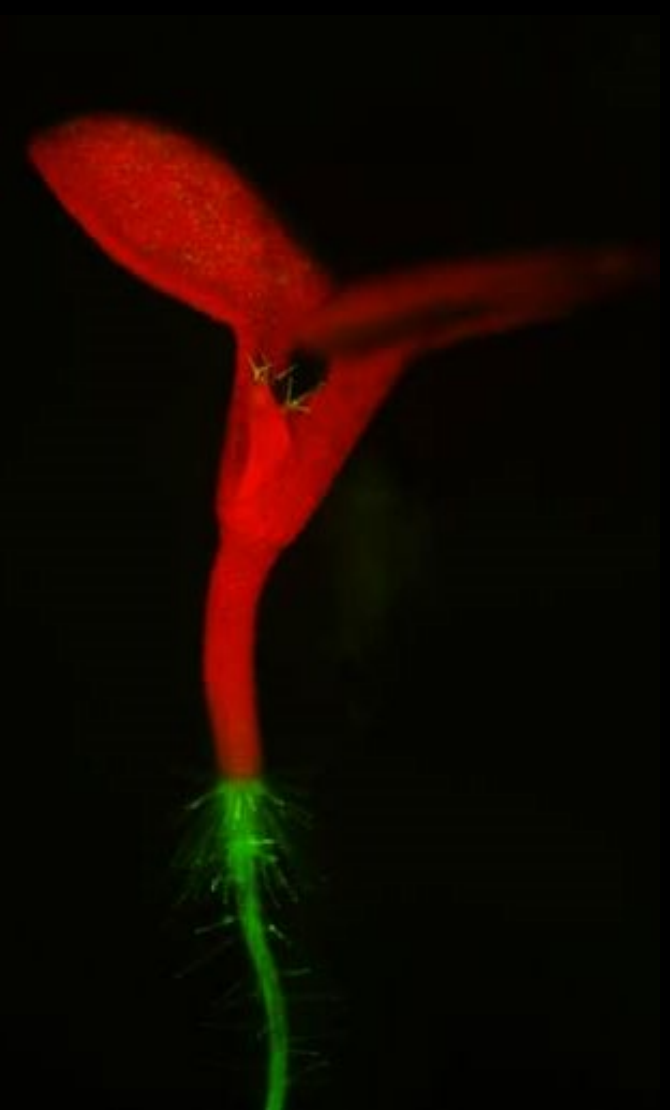
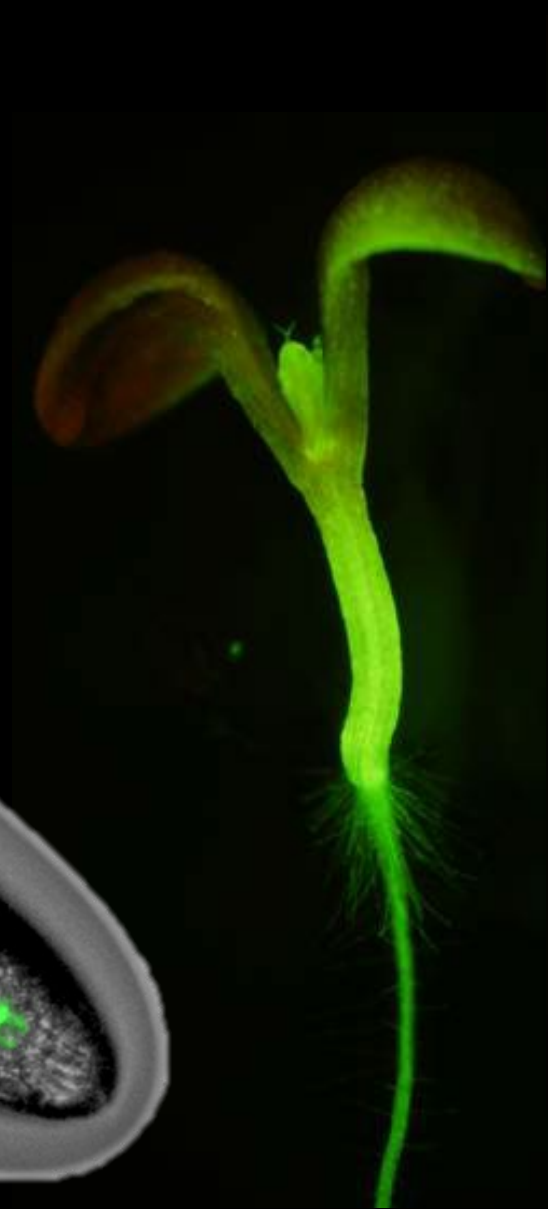
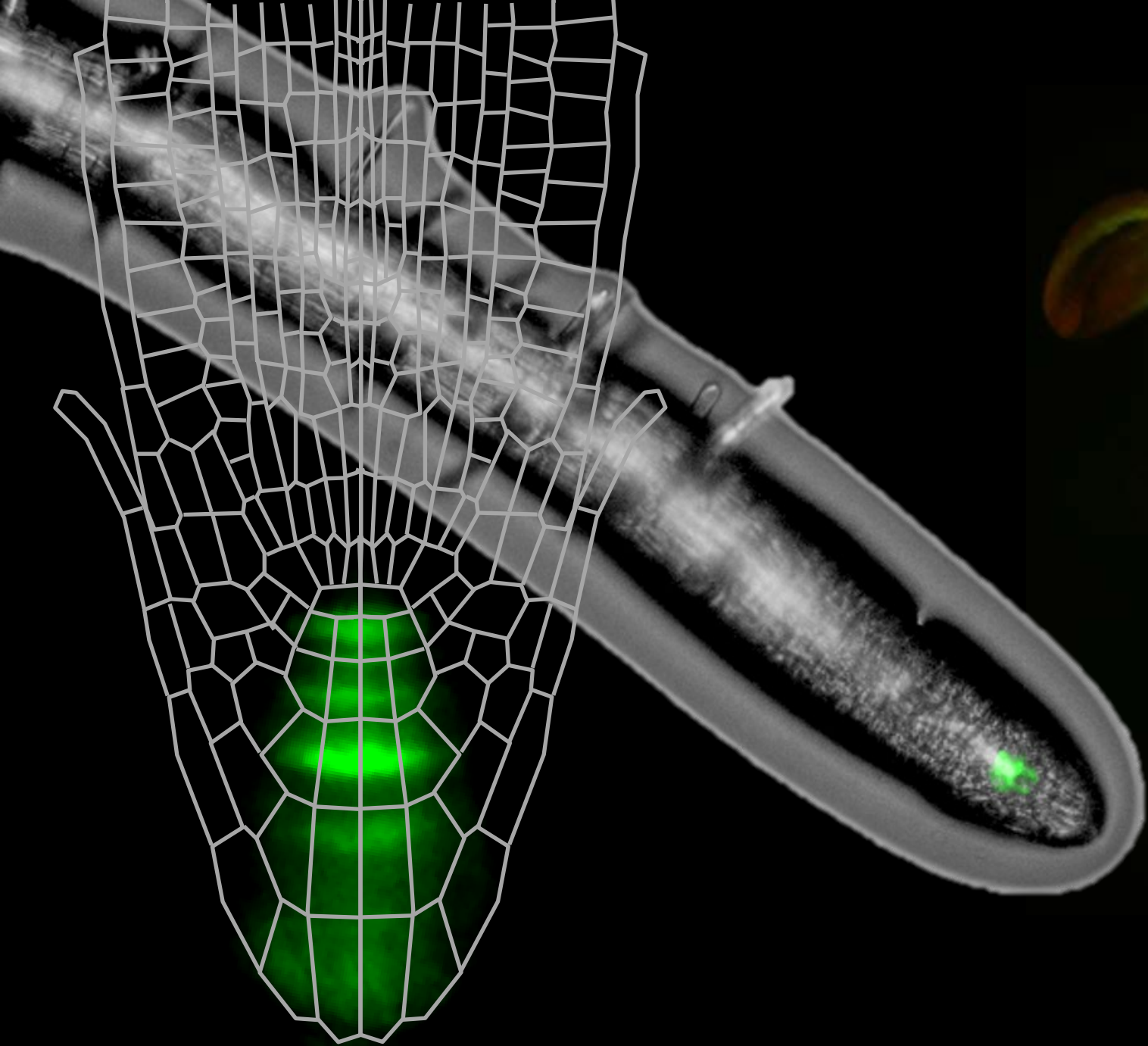


Phaseolus multiflorus: tracks left on inclined smoked glass-plates by tips of radicles in growing downwards. A and C, plates inclined at 60° , B inclined at 68° with the horizon.

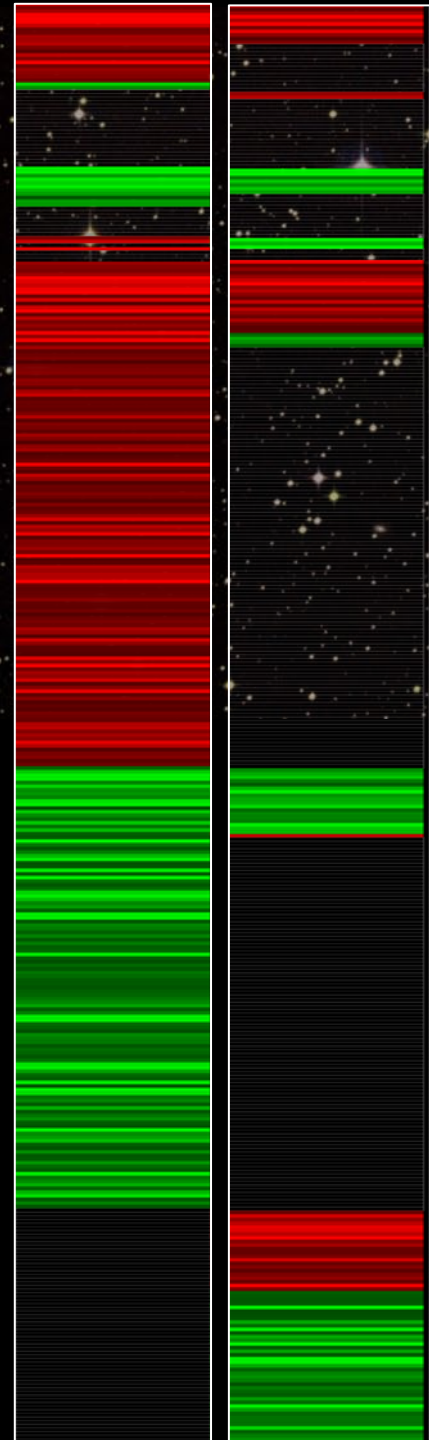


Genes









Ground



Col-0

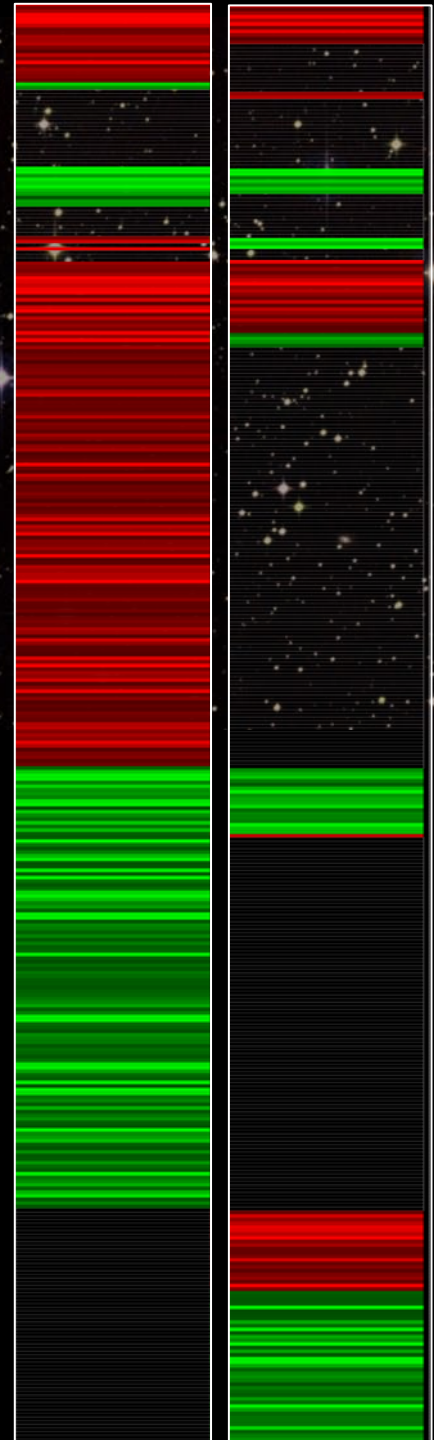
Space



elp2



(*elp2* hates space)









EDEN ISS

PLANT
CULTIVATION
TECHNOLOGIES
FOR SPACE



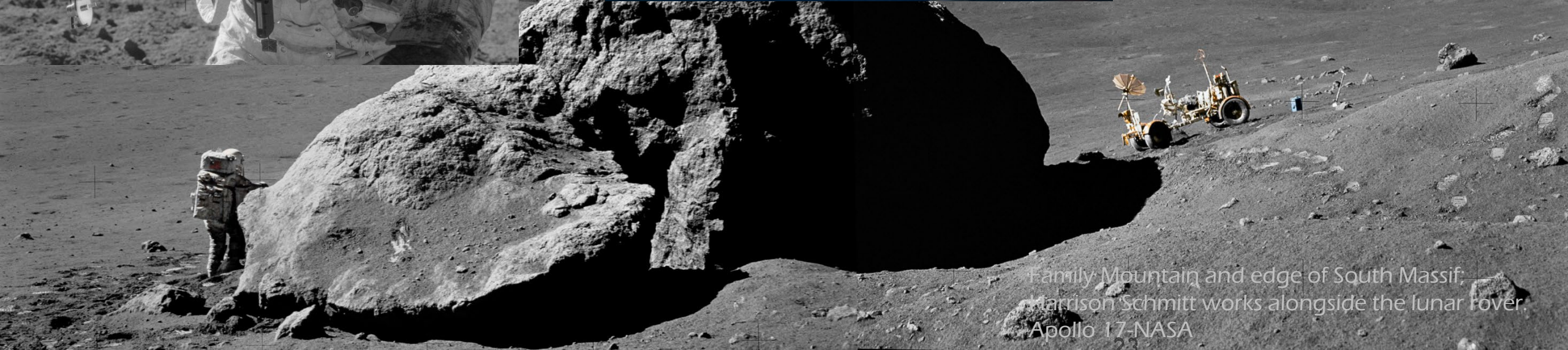
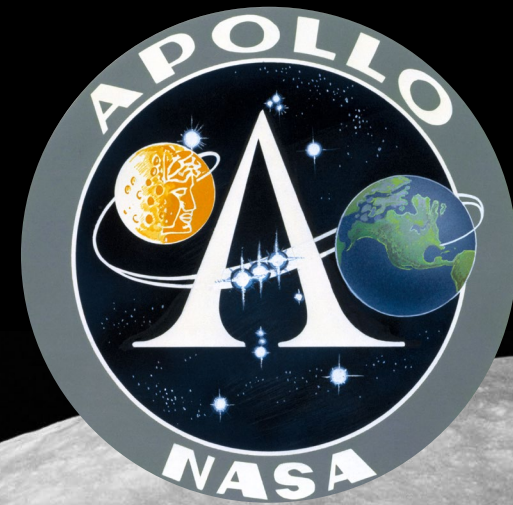












Family Mountain and edge of South Massif;
Harrison Schmitt works alongside the lunar rover.
Apollo 17-NASA

1969



2022



(A decade-long journey)



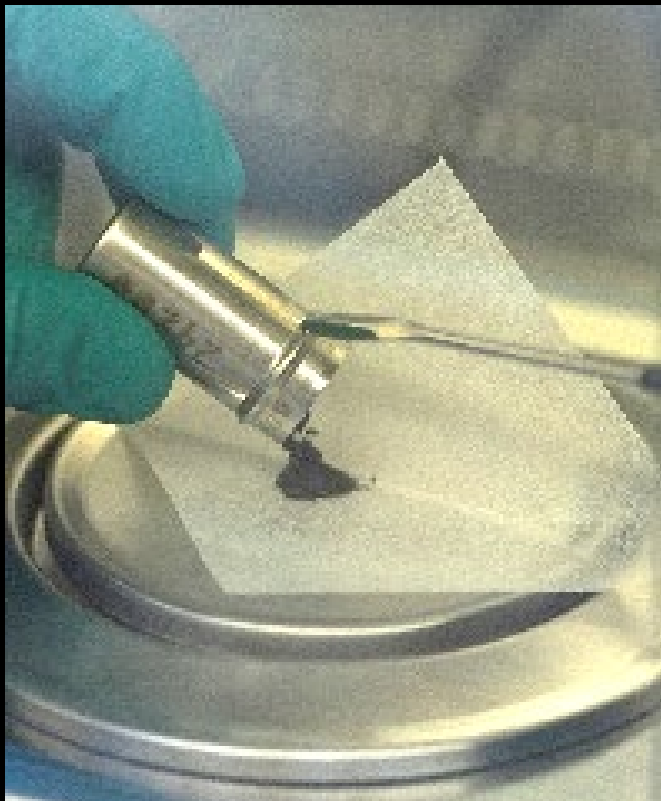
12 grams total

4g Apollo 11

4g Apollo 12

4g Apollo 17





12 grams total =
2.7 Teaspoons total



PLATE 4.0

UF Space





k

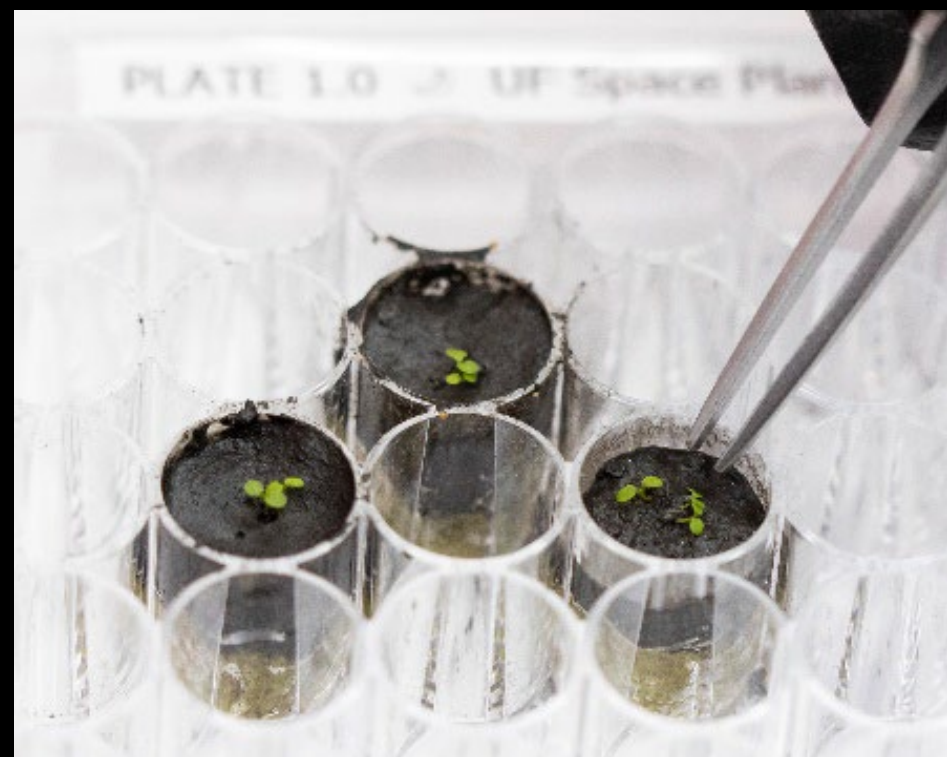
l



They all germinated





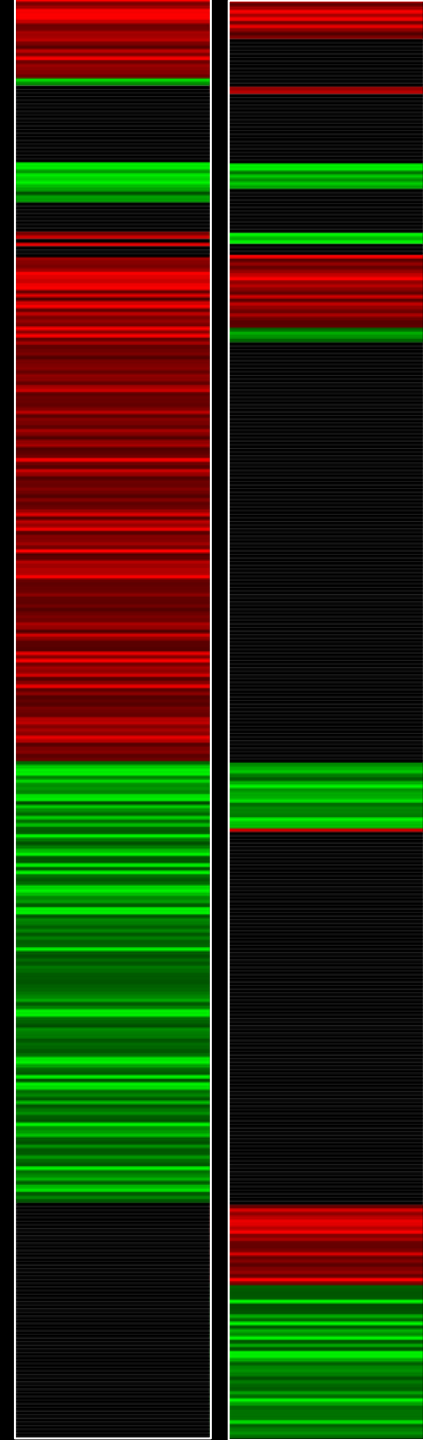


Apollo 17

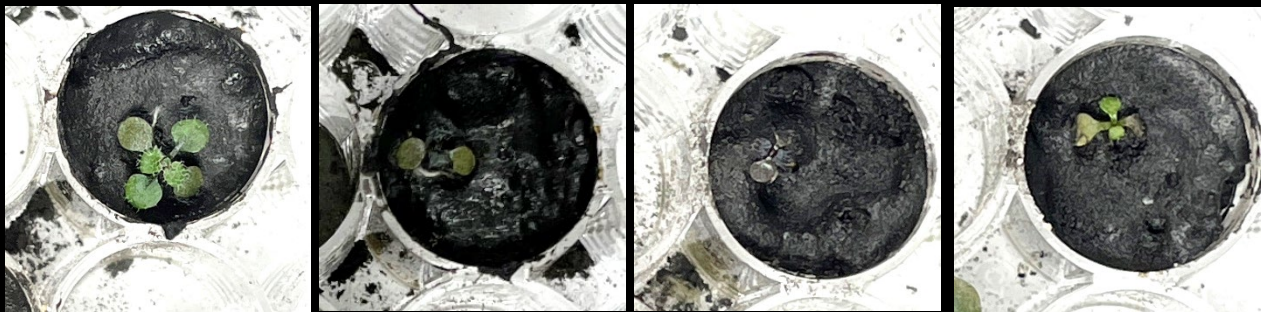


JSC-1A
Control





Apollo
11



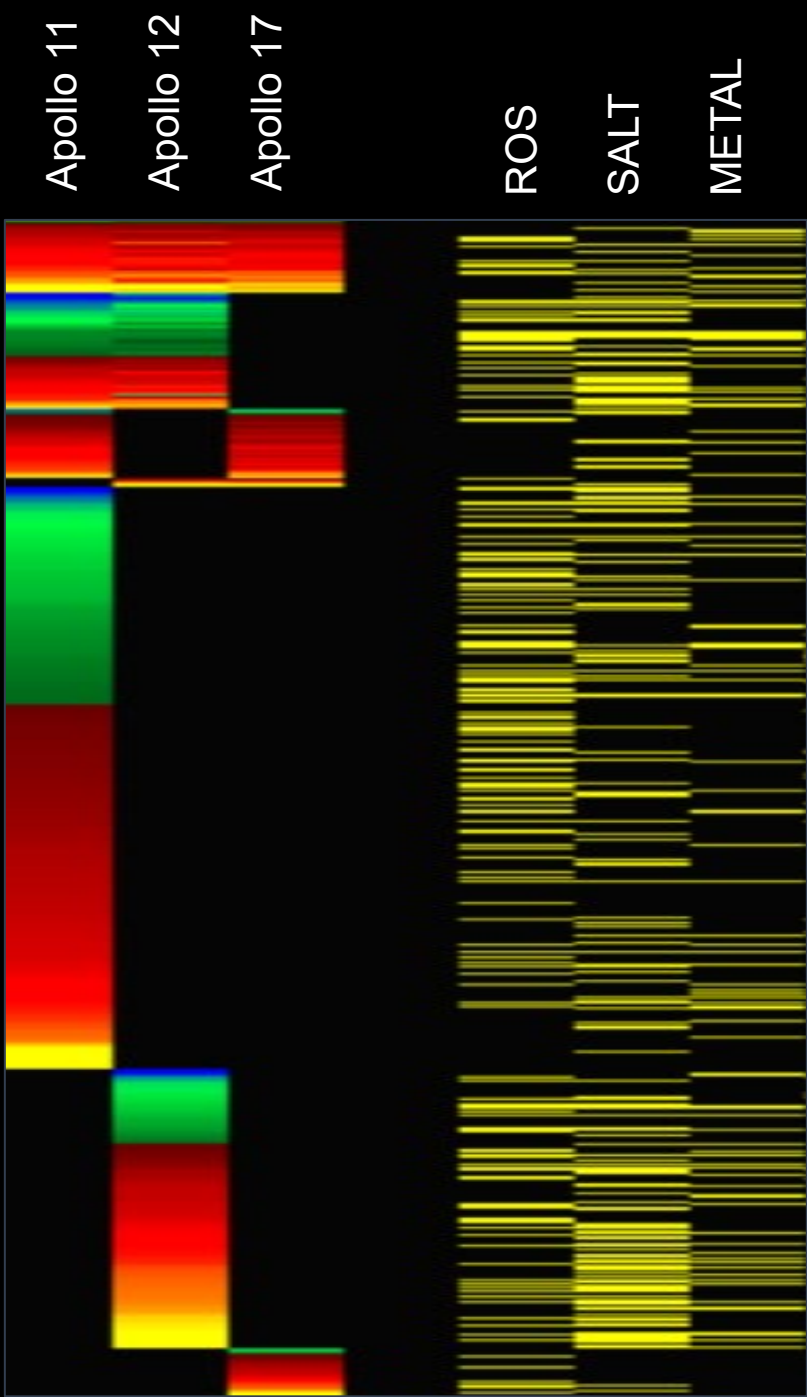
Apollo
12

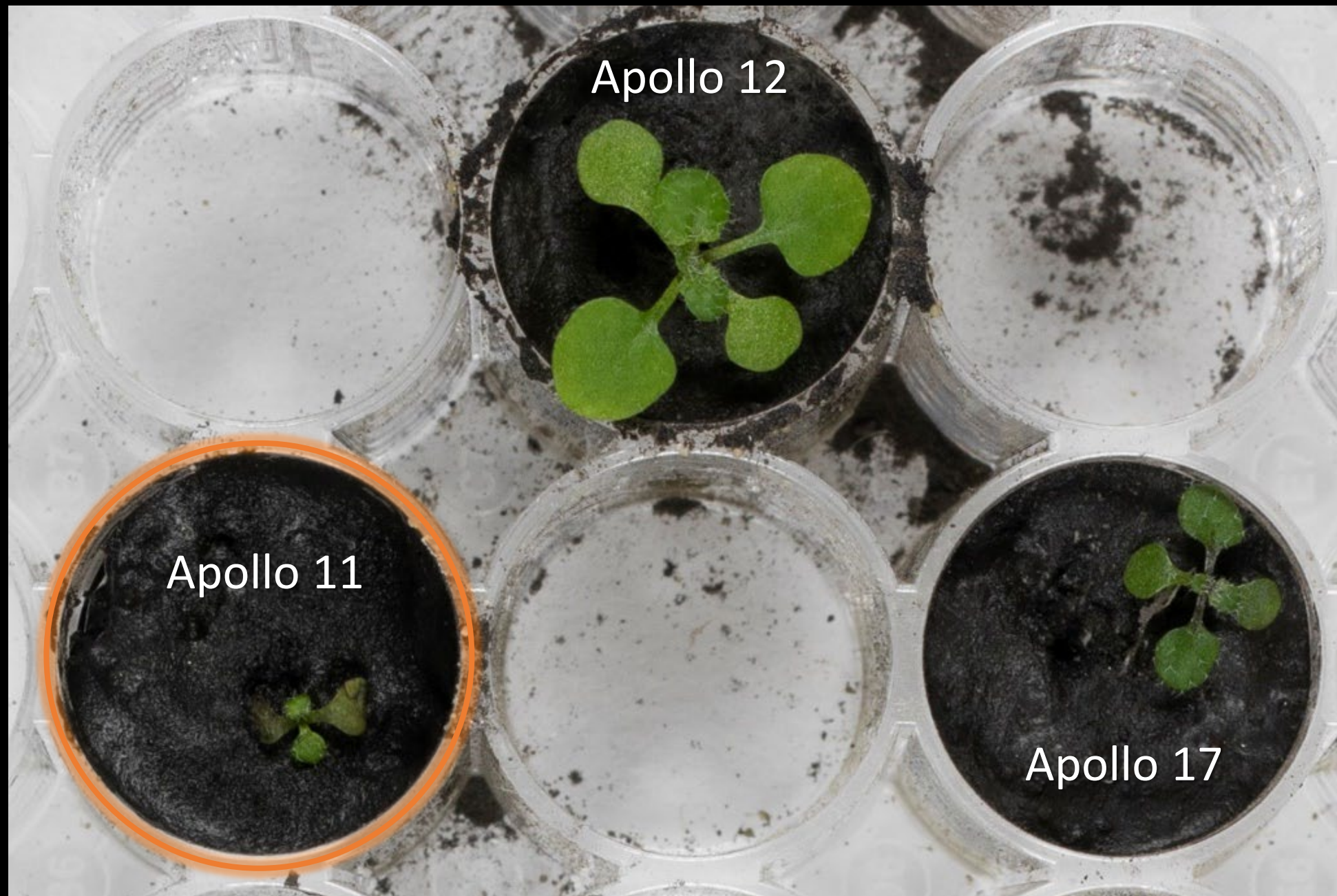


Apollo
17



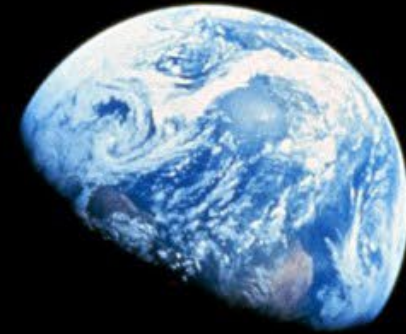
JSC-1A
Earth
Control





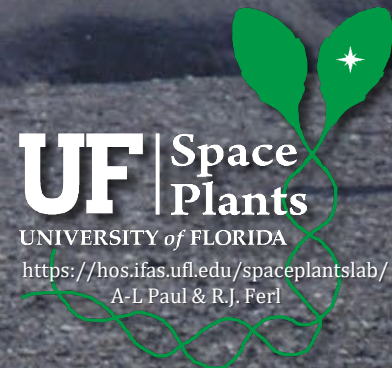
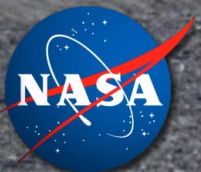


Go Boldly



Many Thanks

Robert Ferl
Anna-Lisa Paul



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