Cleaning-resistant *Cupriavidus* and *Ralstonia* bacteria contaminating spacecrafts and the ultra clean rooms they are assembled in.

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Background. 'Planetary Protection' is preventing microbial contamination of both the target planet and the Earth when sending spacecrafts on interplanetary space mission. It is important to preserve the natural conditions of other planets and to not bring with robots 'earthly microbes' (forward contamination) when looking for 'spores of extra terrestrial life'. Spacecrafts and the ultra clean rooms they are assembled in, are routinely monitored for microbial contamination. It was shown that the floor, air and surfaces of such spacecraft assembly rooms often contain *Cupriavidu*s and *Ralstonia* bacteria. These bacteria not only contaminated the clean rooms but have also been found prior-to-flight on surfaces of space robots such as the Mars Odyssey Orbiter (La Duc et al., 2003) and even in-flight in ISS cooling water and Shuttle drinking water (unpublished). **Aim.** In this study, several *Cupriavidus* and *Ralstonia* strains isolated from space craft assembling rooms and spacecrafts were characterized and analysed in detail. **Results.** The analysis showed that all the *Cupriavidus* and *Ralstonia* clean-room isolates are able to use a wide variety of substrates as carbon sources, including ethanol and acetone. In addition, they all have accumulated moderate resistances to an extraordinary collection of physical and chemical antimicrobial agents. Some of the test strains were able to form biofilms on plastic and metal materials used for space robots, a nutritional and resistance advantage. Surprisingly, all strains were found to be also resistance to a whole range of heavy metals, Moreover, the heavy metal resistance properties seemed to be encoded in 'mobile' DNA fragments (plasmids). This phenotype is very similar to that of well-known strain *Cupriavidus metalliduransans* CH34^T which carries a big collection of heavy metal resistance genes on 2 large plasmids (Mergeay et al., 2000). **Conclusions.** The absence of a clear selection or need for heavy metal resistance for bacteria to survive in a clean-room environment, suggests that these adaptations have been acquired in the past in their original environmental habitat, probably the contaminated soil surrounding the spacecraft assembling

facilities. They were possibly introduced via shoes and equipment. The accumulation of a wide variety of moderate resistances, originally needed to survive in the poor, repeatedly contaminated and continuously changing industrial soil environment, has given these bacteria the advantage to survive different acute and chronically 'life-threatening' stresses more easily and to adapt to new harsh man-made environments such as ultra clean spacecraft assembly rooms. **Future work.** The further study of the source, introduction and survival strategy of these *Cupriavidus* and *Ralstonia* bacteria contaminating spacecraft assembly rooms and spacecrafts, is of importance to improve contamination prevention, monitoring and disinfection tools for the future.