SPACE RENAISSANCE ACADEMY

Committee: Living in Space – Topic: Protection of Human Life & Health in Space

Chair: **Dr. Susan Ip Jewell** (Expert in Space Medicine and Analog Training Commander)

Co-Chair: Dr. Celia Avila-Rauch (Clinical Psychologist, Coach and Psychotherapist)

Why humans shall start living and working in space as soon as possible

Our mother planet has become narrow, for 8 billion citizens. We are already out of resources, energy and environment. Several crises are threatening our civilization and our species, and the sole solution is to go over the limits of our planet, expanding into the outer space, and start benefiting of the immense resources of the Solar System.
Living and working outside our planet for long periods is very different from exploring space, in short missions.
This brief abstract takes a cue from a paper[1] written in 2020 by Adriano V. Autino for the Global Risk Reduction Special Interest Group, within US and International Mensa.

Space travelers shouldn't be astronauts

In general terms, we understood that the problem we are facing is the following one: space settlement will begin when it will be possible to move civilian people to space and accommodate them for long times, eventually as resident space citizen.
As the airlines passengers don't need to be pilots, nor hostesses and nor stewards, the space travelers shouldn't need to be astronauts.
It is clear, for whoever base their reasoning on human rights and interest, that civilians have mission requirements quite different, wrt military trained astronauts. Military people, however sad to say for us humanists, don't have civil rights, by definition, and their life is "spendable". Civilian passengers and settlers need softer traveling conditions, protection against space hard conditions – namely low gravity and cosmic radiations --, green environments in the habitats, without forgetting the legal conditions, as any airline company well know.
The few tourists which flow so far to the ISS paid a $30 million ticket, and signed a release letter, in which they renounced to any warrants about their life and health, relieving the involved space agencies from any damage or harm they could incur during the travel and permanence onboard the station.

The damages to human health caused by long unprotected permanence in space

The dramatic witness released by astronaut Scott Kelly, who spent one year on the ISS (from March 2015 to March 2016), gives evidence of the huge effects of microgravity on human physiology, when lasting for a long time. Which include meaningful physical, cognitive, and genetic (DNA) changes. A comparative study was also conducted not only on Scott's conditions before and after his one year mission, but also with his twin brother Mark, an astronaut as well, who remained on Earth during the same period. As reported by Catherine Zuckerman in an article[2] on National Geographic of April 2019: elongation and subsequent shortening of telomeres, inversions and translocations in chromosomes and damage to DNA, changes in gene expression, thickening in retina and in carotid artery, shifts in gut microbiome. Short telomeres have been associated with reduced fertility' along with dementia, cardiovascular disease, and some cancers. Chromosomal inversions could contribute to genomic instability, which could increase risk of developing cancer. Long permanence in space, getting cosmic and solar radiations many folds higher than what we get on Earth ground (where we are protected by the atmosphere and the Earth magnetic

[1] Autino, Adriano V. - "Expand or Die" 2020 Global Risk Reduction Special Interest Group, within US and International Mensa. http://www.us.mensa.org https://spacerenaissance.space/wp-content/uploads/2020/07/EROSM72K.pdf
[2] https://www.nationalgeographic.com/science/2019/04/study-of-astronaut-twins-hints-at-spaceflight-health-effects/

field), will bring for sure damages and changes in our genetic make-up. Cognitive capacities are affected too. According to an article by Carl Zimmer on The New York Times[3], when Scott Kelly returned on Earth, his body showed signs of intense stress, and his immune system was in high gear. Despite that shock, Mr. Kelly's body mostly returned to preflight condition. People have asked him: 'Well, is going to space the fountain of youth?' I don't think so. If it is, you're going to have to stay up there forever.' That's exactly the point: space citizen could maybe adapt to space conditions -- microgravity maybe, cosmic radiations who knows… -- but for sure they will never come back to Earth, if not on a wheel-chair, and for short times. Holidays on Earth, for space workers and settlers? Not at all.
Last, but not least, from an anthropologic point of view: staying long time in space – as an astronaut – has a strong demotivating effect, on human psychology: if you stay in space enough time, you never want to go back there. We don't want generations of depressed space pioneers, that will curse the day when they abandoned the Earth's ground.

Expanding civilization for getting more freedom

The above considerations paint a gloomy future for us, if we want to expand into space. But, do we really have other choices? No, we don't. Any possible alternative includes a horrible holocaust, very much worse, wrt facing the problems of developing good life conditions in space.
Therefore, our real priority is to develop good living conditions in space.
Having well present that living in space shall be a condition of more freedom for Earthers:
- freedom from coercive daily workouts (simulated gravity is a must),
- freedom from obligation to assume medicines (space medicine should be a recovery means, like it is on Earth, not a mandatory adaptation mean),
- freedom to go back to Earth, for an holiday or to stay, if we will change our mind.

But these are not the only challenges we should tackle. If we want normal people, without astronautic training, can travel to and from orbit, we also need vehicles as comfortable as normal airliners, with horizontal takeoff and landing, low acceleration, safe reenter into atmosphere.
Last, but not least, for the sake of our physical and mental health, we also need:
- green environment in space habitats, flowers, trees, grass, flowing waters and animals with us,
- ocean-like waters, with life inside

Committee Objectives:

This committee's objectives is to actively participate in the discussion of these two topics from a multidisciplinary point of view…

Coming soon

Current Efforts & State of the Art (here shall be attached references to existing literature, polices, agreements and formal recommendation made by the specialists)

Coming soon

Development Plan(s), Agenda, Current Works, Projects, Meetings

Coming soon

Partnerships

- Can we partner with ESA, NASA and other agencies to act as extension of their educational network?
- Can we start a study or survey with the space agencies?
- Can we connect with the IAA and AIAA?

Coming soon

Resources (A list of organizations and offices working on this topic). **Coming soon**

[3] https://www.nytimes.com/2019/04/11/science/scott-mark-kelly-twins-space-nasa.html