

Table of contents

Preface: humans and space – Space and humans.

Monique van Donzel and Jean-Claude Worms v

Introduction: towards a new vision for humans in outer space.

Luca Corignola, and Kai-Uwe Schrogl with Agnieszka Lukaszczyk and Nicolas Peter xv

List of acronyms xx

List of figures xxviii

CHAPTER 1 Setting the scene

1.1 Summary. *Luca Corignola* 3

1.2 Micro-organisms and extraterrestrial travel. *Alfred W. Crosby* 6

1.3 Future Encounters: learning from the past?
Luca Corignola 14

1.3.1 Discovery, encounter, meeting, contact: old wine
in new bottles 14

1.3.2 Contact: the ideological issue 16

1.3.3 Contact: the biological issue 17

1.3.4 Has history prepared us for contact? 19

1.4 Are we alone? Searching for life in the universe and its creation. *Gerhard Haerendel* 22

1.4.1 Introduction 22

1.4.2 The ubiquity of life 22

1.4.3 Searches for life in the solar system 24

1.4.4 Extrasolar planets 26

1.4.5 Confinement to the solar system 28

1.4.6 Communication with other civilizations 30

1.4.7 Summary 33

1.5	What's the story, mother? Some thoughts on Science Fiction Film and Space Travel. <i>Thomas Ballhausen</i>	35
1.5.1	Tales about the future	35
1.5.2	Historical development	36
1.5.3	Recent examples	40
1.5.4	Appendix: list of evaluated film examples	41
1.6	Aiming ahead: next generation visions for the next 50 years in space. <i>Agnieszka Lukaszczyk</i>	44
1.6.1	The past and the future.	44
1.6.2	Aiming ahead.	45
1.6.3	Ensuring the survival interests of humanity.	46
1.6.4	Conclusions	51
 CHAPTER 2 Can we compare?		
2.1	Summary. <i>Monique van Donzel</i>	57
2.2	<i>Inter caetera</i> and outer space: some rules of engagement. <i>James Muldoon</i>	59
2.2.1	Introduction	59
2.2.2	Regulating the Ocean Sea	60
2.2.3	The universal human community.	62
2.2.4	The world divided	64
2.2.5	Hugo Grotius and the protestant response	65
2.2.6	The Papal world order in secular garb	66
2.2.7	Conclusion.	67
2.3	Celestial bodies: Lucy in the sky. <i>Gísli Pálsson</i>	69
2.3.1	Introduction	69
2.3.2	Zooming in and out	69
2.3.3	Fetal space	70
2.3.4	The universe within	72
2.3.5	Hunting and gathering genes.	73
2.3.6	Elementary structures	75
2.3.7	Mappings.	76

2.3.8	Out of Africa, out of Earth	77
2.3.9	Human evolution	78
2.3.10	The phenomenology of space.	79
2.3.11	Conclusion.	80

2.4 Why we had better drop analogies when discussing the role of humans in space. *Sven Grahn* 82

2.4.1	Analogies used in the early space age to define the role of humans in space	82
2.4.2	Explorers of new worlds	82
2.4.3	Man as attendant at a staging point in space.	86
2.4.4	The scientist in the field or in the laboratory.	86
2.4.5	The factory worker	86
2.4.6	Modern analogies for the role of humans in space.	87
2.4.7	How is the role of humans affected by the cost/risk aspect of space flight?	88
2.4.8	Conclusion.	88

CHAPTER 3 "Spatiality" – Space as a source of inspiration

3.1 Summary. *Olivier Francis* 93

3.2 Missing the important: how we talk and write about space. *Ulrike Landfester* 94

3.2.1	Introduction	94
3.2.2	The Motto's Mission: a case study.	95
3.2.3	Conclusions	104

3.3 Towards a new inspiring era of collaborative space exploration. *Nicolas Peter* 107

3.3.1	Introduction	107
3.3.2	How are current space exploration plans different from earlier space endeavors?	107
3.3.3	Benefits of international cooperation	114
3.3.4	Metaprinciples for space exploration.	115
3.3.5	Inspirational potential of international cooperation	115
3.3.6	Conclusions	117

**CHAPTER 4 First Odyssey: Humans in Earth orbit:
what effect does it have?**

4.1 Summary. *Marcel Egli* 121

4.2 With the eyes of an astronaut. *Claude Nicollier.* 124

4.2.1 The discovery 124

4.2.2 The view from above. 125

4.2.3 Where do we go next?. 126

**4.3 Human spaceflight, technology development
and innovation.** *Richard Tremayne-Smith* 128

4.3.1 The first effect – inspiration from space 128

4.3.2 The second effect – supporting life on Earth 128

4.3.3 Reality 129

4.3.4 Technology and innovation 129

4.3.5 What space has to offer. 130

4.3.6 Conclusions 132

**4.4 Human-machine cooperation in space
environments.** *Gabriella Cortellessa, Amedeo Cesta
& Angelo Oddi* 135

4.4.1 Introduction 135

4.4.2 Human-machine cooperation. 137

4.4.3 Lessons learned from experience: two case studies. 138

4.4.4 Findings and conclusions. 145

**4.5 Space law in the age of the International Space
Station.** *Frans G. von der Dunk.* 148

4.5.1 Introduction 148

4.5.2 Towards an International Space Station 148

4.5.3 The novelty of the International Space Station 151

4.5.4 Space law and the International Space Station 153

4.5.5 What comes next?. 157

**CHAPTER 5 Second Odyssey: Humans in space
exploration: what effects will it have?**

5.1 Summary. <i>Jean-Pierre Swings</i>	165
5.2 Humans – more than the better robots for exploration? <i>Wolfgang Baumjohann</i>	167
5.2.1 Introduction	167
5.2.2 Scientific exploration	167
5.2.3 Real exploration	169
5.2.4 Conclusion	170
5.3 Humans leaving the Earth – a philosopher's view. <i>Jacques Arnould</i>	171
5.4 Human spaceflight as a matter of culture and national vision. <i>Stephan Lingner</i>	175
5.4.1 Introduction	175
5.4.2 The utility of spaceflight	175
5.4.3 The trans-utilitarian perspective	175
5.4.4 Arguments at national level	178
5.4.5 Remaining ethical questions	179
5.4.6 Conclusion	180
5.5 The need of a legal framework for exploration. <i>Ulrike Bohlmann</i>	182
5.5.1 Introduction	182
5.5.2 The term “exploration” in the <i>Corpus Iuris Spatialis</i>	183
5.5.3 The non-appropriation principle	185
5.5.4 Protection of the environment	186
5.5.5 The use of nuclear power sources	189
5.5.6 International cooperation	190
5.5.7 Some trends in the evolution of the law	192

CHAPTER 6 Third Odyssey: Humans migrating the Earth: how will it affect human thought?

6.1 Summary. *Jean-Claude Worms* 199

6.2 Mars as a place to live? Past, present and future.
Gerda Horneck 202

6.2.1 Introduction 202

6.2.2 Past Mars 204

6.2.3 Present Mars 205

6.2.4 Future Mars 208

6.3 Philosophical and religious implications of extraterrestrial intelligent life. *Paolo Musso* 210

6.3.1 The big issue 210

6.3.2 Philosophical issues 211

6.3.3 Religious issues 213

6.3.4 How should we manage such a discovery? 216

6.3.5 Appendix: Managing ET's technology 217

6.4 ET culture. *Debbora Battaglia* 220

6.4.1 The alien de-exoticized 220

6.4.2 Galaxies of space discourse 221

6.4.3 Modeling an ET diplomacy 222

6.4.4 The ET effect upon the social 224

CHAPTER 7 The Vienna vision on humans in outer space 227

About the authors 234

Acknowledgements 246