SCULPTURE TODAY

A New Renaissance and Transhumanism

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KIPARSTVO DANES

Nova renesansa in transhumanizem

Kazalo / Contents

Polona Tratnik

Renesansa in preživetje človeške vrste

S tretjo edicijo projekta *Kiparstvo danes* pokrivamo polje kiparstva pogojno, pa vendar: tematiziramo zelo sodoben pojav prepletanja umetnosti z znanostjo, ki ga lahko povežemo prav s pričetki pojava, ki smo mu v teku modernosti nadeli ime umetnost. V zadnjem desetletju se utrdijo prakse na presečišču umetnosti in znanosti, sodobni umetniški centri spodbujajo delovanje umetnikov v laboratorijih in sodelovanje z znanstveniki v transdisciplinarnih projektih, prestižni znanstveni centri, kot npr. Cern, odprejo vrata umetnikom v okviru rezidenčnih programov. Moderna oblika znanosti, katere ideal je newtonovska empirična in matematična fizika, je na pragu tisočletja dobila vzporedni program znanosti, t.i. znanost drugega načina,[1] ki temelji na transdisciplinarnosti, je heterarhično in heterogeno osnovana in se pojavlja v bolj začasnih, manj institucionaliziranih projektnih oblikah. S tem znanost izgublja tisto, kar jo je identificiralo skozi modernost: avtonomijo. Znanost ne more biti več razumljena kot avtonomni prostor, jasno ločen od drugih

1 Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott, Martin Trow, *The New Production of Knowledge*, London: Sage Publications Inc, 2009.

Polona Tratnik

The Renaissance and the Survival of the Human Species

With the third edition of the *Sculpture Today* project, we look at the field of sculpture conditionally, and yet: we discuss the very contemporary occurrence of the intertwining of art with science, which links right back to the onset of the phenomenon that we labelled as art through the course of modernity. In the recent decade practices at the intersection of art and science have consolidated, contemporary art centres continue to stimulate artists to work in laboratories and collaborate with scientists in transdisciplinary projects, prestigious scientific centres, such as CERN, are opening their doors to artists as part of residency programmes. Science in its modern form, whose ideal rests in Newton's empirical and mathematical physics, gained a parallel scientific programme on the threshold of the millennium, i.e. another type of science,[1] which is based on transdisciplinarity, is heterarhically and heterogeneously founded and takes the form of more temporary, less institutionalized projects. And with it, science is losing the very thing by which it was identified throughout modernity: its autonomy.

1 Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott, Martin Trow, *The New Production of Knowledge*, London: Sage Publications Inc, 2009.

družbenih polj.[2] Podobno se tudi polje umetnosti po koncu modernizma odpira in povezuje z drugimi družbenimi polji, ki so vsa postala notranje heterogene in navzven medsebojno povezane in odvisne, včasih celo ne več ločene in razločljive sfere. Te spremembe omogočajo osnovo, na kateri se umetnost v sodobnosti ne pojavlja le kot družbeni servis ali antropološko raziskovanje, pač pa tudi kot kompleksno organizirana raziskovalna struktura, ki vključuje strokovnjake z več področij in ki proizvaja rezultate, ki so relevantni tako estetsko kot znanstveno in humanistično. Predvsem zaradi aktualnih etičnih vprašanj na področju znanosti o življenju in biotehnologije, ki terjajo takojšnje rešitve, v sodobnosti tudi sicer večdisciplinarni, a v osnovi še vedno zlasti naravoslovni znanstveni centri, k aktivnemu sodelovanju vabijo humanistične in družboslovne znanstvenike. Tako je skupina raziskovalcev in inženirjev s petih vodilnih ameriških raziskovalnih univerz (University of California, Berkeley; Massachusetts Institute of Technology; Harvard; University of California, San Francisco; in Praisire View Agricultural and Mining) leta 2006 ustanovila skupni raziskovalni center: the Synthetic Biology Engineering Research Center (SynBERC: www.synberc.org), kamor so k aktivnemu sodelovanju povabili tudi humanistična raziskovalca: Paula Rabinowa in Gaymona Bennetta.[3] A kot zapazita slednja v okviru omenjenega eksperimenta, zagovorniki znanosti prvega načina, kot tudi ustanovitelji sintezne biologije, vidijo žarišče humanističnih praks v biovarnosti. Tako so tudi od njiju pričakovali, da bosta zagotovila vodila za regulacijo sintezne biologije tako, da se minimalizirajo škodljivi varnostni dogodki v sodobnem političnem miljeju.[4] To nas z entuziastične pozicije prestavi k problemu: ali sta v utilitarističnem svetu, kot v njem živimo, tudi humanistika in celo umetnost prešli v servis drugim družbenim praksam, tehnoznanosti in politiki? Je to druga plat izgubljanja avtonomije?

S pričujočo razstavo smo si zadali ambiciozne cilje. Z vodstvi naravoslovno raziskovalnih centrov v Sloveniji smo se dogovorili za aktivno sodelovanje raziskovalnih skupin in umetnikov, ki smo jih na osnovi njihovih predhodnih izkušenj na področju prepleta umetnosti in znanosti povabili k sodelovanju. Zelo smo veseli, da se je pri tem izkazalo, da so direktorji teh institucij zelo odprti za ta predlog in z zanimanjem podpirajo eksperimentalno priključevanje umetnikov k znanstveno-raziskovalnim skupinam. Ob tej priložnosti se posebej zahvaljujemo Tamari Lah Turnšek z Nacionalnega inštituta za biologijo in Jadranu Lenarčiču z Inštituta Jožef Stefan. Po

Science can no longer be seen as an autonomous space, clearly separated from other social fields.[2] Similarly, the field of art is also opening up and making connections with other social fields after modernism, all of which are becoming heterogeneous internally and externally interconnected and interdependent, sometimes no longer divided and divisible spheres. These changes provide the basis upon which art within contemporaneity does not merely occur as a social service or anthropological research, but also as a complexly organized research structure, which includes experts from several fields, producing results that are relevant in terms of aesthetics, as well as science and the humanities. Mainly due to the current ethical issues in the field of the life sciences and biotechnology, which require urgent solutions, science centres that are in this day and age multidisciplinary but remain fundamentally scientific, are inviting scientists from the fields of humanities and social studies to actively participate. In such a way, a group of researchers and engineers from five leading U.S. research universities (University of California, Berkeley; Massachusetts Institute of Technology; Harvard; University of California, San Francisco; in Praisire View Agricultural and Mining) set up a joint research centre: the Synthetic Biology Engineering Research Center (SynBERC: www.synberc.org) in 2006, also inviting two humanities researchers to become actively involved: Paul Rabinow and Gaymon Bennett.[3] But as the twosome note as part of the aforementioned experiment, the advocates of science of the first mode, as well as the founders of synthetic biology, see the focus of humanistic practices in biosecurity. And so it was also expected of them, that they would provide guidelines for the regulation of synthetic biology so as to minimize adverse safety events within the contemporary political milieu.[4] From the enthusiastic position this brings us to a problem: in the utilitarian world as we live it, have the humanities and the arts switched to the services of the other social practices, technosciences and politics? Is this the other side of the loss of autonomy?

With this exhibition, we have set ourselves some ambitious goals. We have come to agreements with the leaders of several scientific research centres in Slovenia that support the active participation of research groups and artists, which we invited to participate on the basis of their previous experience in intertwining art with science. We are very pleased that the directors of these institutions have proven to be very open to this proposal

2 Helga Nowotny, Peter Scott, Michael Gibbons, *Re-Thinking Science. Knowledge and the Public in an Age of Uncertainty*, Cambridge: Blackwell Publishers Ltd, 2007, str. 1.

2 Helga Nowotny, Peter Scott, Michael Gibbons, *Re-Thinking Science. Knowledge and the Public in an Age of Uncertainty*, Cambridge: Blackwell Publishers Ltd, 2007, p. 1.

3 Rezultat tega eksperimentalnega sodelovanja je pravkar izšla monografija: Paul Rabinow, Gaymon Bennett, *Designing Human Pracitces. An Experiment with Synthetic Biology, Chicago*, London: The University of Chicago Press, 2012.

4 Ibid., str. 157.

3 The result of this experimental collaboration has recently published in a monograph: Paul Rabinow, Gaymon Bennett, *Designing Human Pracitces. An Experiment with Synthetic Biology*, Chicago, London: The University of Chicago Press, 2012.

4 Ibid., p. 157.

drugi strani pa moramo skleniti, da so državne strukture za omogočanje takšnega povezovanja skrajno zakrnele in temeljijo prav na nasprotnem modelu avtonomnega modernega umetnika, ki se izkazuje s plodno produkcijo in preživlja s prodajo svojih del. Predvsem iz tega razloga smo bili primorani nekatera sodelovanja prekiniti, kar močno obžalujemo. Naše kuratorsko vodilo je bilo tokrat nekoliko predrzno: ne želimo umetniških projektov, ki si bodo podredili znanstvene raziskave – že obstoječe raziskave zgolj prenašali v umetniški kontekst ali naročali nove za svoje »umetniške« potrebe. Če nismo hoteli pristati na pogoste ošabne predstave naravoslovne znanosti, da je relevantno zgolj tisto, kar počne in proizvaja sama, medtem ko umetniško pomeni barvito ali ljubko, prav tako nismo hoteli umetniških projektov, ki znanost zgolj interpretirajo oziroma tematizirajo. Projekt *Nova renesansa* je bil eksperimentalno zasnovan: umetnikom in raziskovalnim skupinam omogočiti, da izpeljejo skupne raziskave in predstavijo rezultate, ki so lahko raznoliki in niso nujno »izčiščene« estetske instalacije. Kolikšen bo delež in način znanstvenega prispevka in kolikšen bo poudarek na umetniškem delu v posamičnem projektu in njegovi predstavitvi, je bilo torej vprašanje, prepuščeno posamičnim skupinam. Zavedamo se, da smo s tem odprli vrsto aktualnih vprašanj, kot so: kakšno sploh je današnje razumevanje umetnosti in njen smisel, kaj pomeni avtorstvo, kaj pomeni znanstveno raziskovanje, kaj lahko k znanstvenemu projektu doprinese umetnik itd., ki si jih bo potrebno še zastavljati. Nanja ni enostavnih odgovorov

and are supporting the experimental addition of artists to scientific research teams with interest. On this occasion we especially thank Tamara Lah Turnšek from the National Institute of Biology and Jadran Lenarčič from the Jožef Stefan Institute. Alternatively, it must be concluded that the state structures for the facilitation of such integrations are grossly degenerated and are founded on the exactly the opposite model of the autonomous modern artist who demonstrates his accomplishments through a fruitful production and earns a living by selling his works. It was mostly for this reason that we have been forced to terminate some of our collaborative activities, which we deeply regret. Our curatorial principle was somewhat audacious this time: we did not want art projects that would be subordinate to scientific research – that would merely transfer existing research into an art context or commission new findings for their own 'artistic' purposes. If we were unhappy to settle for the all too frequently haughty notions of the natural sciences that only seem to find their own production of any relevance while they deem art to be colourful and pretty, we also wanted to avoid art projects that merely interpret or thematize science. The *New Renaissance* was conceived experimentally: to give artists and research groups a chance to carry out joint research and present their results, which could take on diverse forms and did not necessarily need to follow the notion of 'purified' aesthetic installations. The extent and method of the scientific contribution, as well as the degree of emphasis on the artistic part of each individual

in eden od namenov tega projekta je zagotoviti platformo, ki bo omogočila ali celo izsilila določene odgovore nanje, ki jih bomo lahko do neke mere prediskutirali že v času trajanja projekta: z umetniki, znanstveniki in kustosi, pa tudi z estetiki – za ta namen smo projekt povezali s sorodnim projektom na področju estetike, kolokvijem Slovenskega društva za estetiko z naslovom *Presežna umetnost: umetnost – znanost – filozofija*.[5]

Iz delovanja Dragana Živadinova na področju kozmokinetičnega gledališča iz devetdesetih let dvajsetega stoletja, pri katerem sta se mu kot redna sodelavca pridružila Miha Turšič in Dunja Zupančič, se je razvila ambiciozna ideja vzpostavitve centra za kulturalizacijo vesolja. Prav letos Kulturno središče evropskih vesoljskih tehnologij (KSEVT) v Vitanju odpira svoja vrata. Izvorno se KSEVT nanaša na delo pionirja kozmonavtike Hermana Potočnika Noordunga, katerega družina izvira iz Vitanja. Center bo predstavil njegovo delo in redno organiziral razstave, prek bogatih mednarodnih povezav in zagotovitve študijskega gradiva pa bo center omogočal tudi raziskovalno delo na področju humanistike v navezavi na kozmologijo. V kratkem bo center prek sodelovanja Slovenije in Rusije omogočil odhod plesalke Mateje Rebolj na mednarodno vesoljsko postajo in nato v roku treh let polet v vesolje.

project and its presentation, was therefore a question that was left up to the individual groups. We are well aware that by doing so we have opened up a series of topical questions, such as: how do we understand art today and what is its meaning, what constitutes authorship, what constitutes scientific research, how can an artist contribute to a scientific project, etc., which will need to be posed in continuance. There are no easy answers to these questions and one of the purposes of this project is to provide a platform that will allow or even force some of these questions out into the open. We will have the opportunity to discuss these issues, at least to a limited extent, already through the course of the project: with artists, scientists and curators, as well as aestheticians – this is why we have linked the project with a related project in the field of aesthetics, the colloquium of the Slovenian Society for Aesthetics entitled *Surplus Art: Art – Science – Philosophy*.[5]

The initial work performed by Dragan Živadinov in the 1990s in the field of cosmokinetic theatre, in which Miha Turšič and Dunja Zupančič joined as regular collaborators, has developed into an ambitious idea of establishing a centre for the culturalisation of space. It is precisely in this year that the Cultural Centre

5 Kolokvij bo potekal med 10. in 13. 10. 2012 – po konferenčnem programu 11. in 12. 10. bodo domači in tuji udeleženci v soboto, 13. 10., obiskali razstavišče in se udeležili simpozija razstavljajočih skupin. ‹www.sde.si›

5 The colloquium will be held from 10 to 13 October 2012 – after the conference programme on 11 and 12 October, local and foreign participants will visit the exhibition on Saturday, 13 October, and attend the symposium of the exhibiting groups. ‹www.sde.si›

Projekti takšnih razsežnosti so utemeljeni na Memorandumu o kulturalizaciji vesolja, ki so ga podpisali Majda Širca, Danilo Türk in Andrej Medvedjev, ter dogovoru o sodelovanju, ki sta ga podpisala Oto Luthar za Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti in Jurij Baturin za Inštitut za zgodovino znanosti in tehnologije Ruske akademije znanosti. Namen večletnih prizadevanj umetniške trojice Živadinov – Turšič – Zupančič za kulturalizacijo vesolja je iniciativa, da vesolja ne bi razumeli le kot prostor militarizacije in komercializacije, temveč tudi drugače: kot prostor različnih možnosti, med drugim kot prostor umetnosti in refleksije raznoterih dejavnosti v vesolju.

Če si poskušamo zamisliti ustvarjalca renesančnega tipa v današnjem času, moramo pri tem upoštevati trenutni doseg znanosti in tehnologije, ki je bistveno kompleksnejši od renesančnega, ko ne nazadnje niti še ne moremo govoriti o znanosti v modernem smislu. Kar danes razumemo kot znanost in tehnologijo, je veliko bolj zapleteno, tehnološko sofisticirano, vednostno bogato in finančno izdatno, kot so bili zametki moderne znanosti v renesansi. V raziskovanju vesolja je pravi preboj šele v sedemnajstem stoletju zagotovil teleskop kot instrument, ki je obogatil vidnost. Ljudje so ob tem tehnološkem odkritju celo verjeli, da odtlej noben del neba ne bo ušel pogledu.[6] Vid in vidnost sta v modernosti igrala ključno vlogo pri pridobivanju vednosti. Tako lahko že renesančno ponovno odkritje anatomije razumemo v tem oziru. Za vednost in poseganje v človeško telo podobno igrajo pomembno vlogo instrumenti vidnosti, a renesančni človek je predvsem z odpiranjem telesa poskušal razumeti njegovo naravo. Seciranje je postalo praksa učenja o telesni anatomiji, bilo pa je tudi osnova za kartografiranje telesa. Renesansa je odkrivala telo na podoben način, kot je odkrivala nove prostore sveta, zato ni naključje, da renesančne risbe anatomije sovpadajo z zemljevidi novega sveta. Telo je bilo še neraziskano območje, svet z nepredvidljivimi razsežnostmi, kot to lažje razumemo šele danes ob vrsti projektov, osredotočenih na kartografiranje telesa: genoma, anatomije in možganov. Leonardo da Vinci je v svojo *Razpravo o anatomiji* (1489–1515) vključil 200 strani anatomskih risb,

6 Ofer Gal in Raz Chen-Morris trdita, da instrumenti sedemnajstega stoletja, kot sta teleskop in mikroskop, niso ponudili razširitve in izboljšave čutil, temveč so jih v celoti zamenjali ter je oko postalo delo instrumenta. Raziskovalci so se popolnoma zanašali na avtoriteto instrumenta in Galileo ga je razumel kot matematičnega po svojem bistvu. Povečevanje je matematični odnos in teleskop opravlja to nalogo. Ofer Gal, Raz Chen-Morris, »Empiricism Without the Senses: How the Instrument Replaced the Eye«, v: Charles T. Wolfe, Ofer Gal (ur.), *The Body as Object and Instrument of Knowledge. Embodied Empiricism in Early Modern Science, Studies in History and Philosophy of Science*, letn. 25, 2010, str. 121–147.

of European Space Technologies (KSEVT) in Vitanje is opening its doors. Originally KSEVT refers to the work of cosmonautics pioneer Herman Potočnik Noordung, whose family comes from Vitanje. The centre will present his work and regularly organize exhibitions, whereas it will also enable research in the field of the humanities in connection to cosmology through its extensive international networks and available study materials. Through the cooperation between Slovenia and Russia, the Centre will soon make it possible for dancer Mateja Rebolj to depart to an international space station, and then within three years, to fly into space. Projects of this magnitude are backed by the Memorandum of Culturalisation of Space signed by Majda Širca, Danilo Türk and Andrej Medvedjev, and the cooperation agreement signed by Oto Luthar for the Scientific Research Centre of the Slovenian Academy of Arts and Sciences and Jurij Baturin for the Institute of History of Science and Technology of the Russian Academy of Sciences. The aim of the long-standing endeavours of the Živadinov – Turšič – Zupančič artistic threesome in the culturalisation of space is an initiative to promote an understanding of space, not only in terms of militarization and commercialization, but also otherwise: as a place of multiple possibility, including as a place of art and the reflection of various activities within space.

If we try to imagine a Renaissance type of artist in today's day and age, we need to take into account the current range of science and technology, which is much more complex than that of the Renaissance, when one can not even begin to talk about science in the modern sense. What we understand as science and technology today is far more complex, technologically sophisticated, scientifically rich and financially substantial, than the beginnings of modern science during the Renaissance were. It was only in the seventeenth century that a real breakthrough was provided in the exploration of space by the telescope as an instrument, which enchanced visibility. When this technological discovery was made, people even believed that no part of the sky would escape the gaze.[6] Vision and visibility played a major role in the acquisition of knowledge in modernity. So the rediscovery of anatomy during the Renaissance can already be understood in this context. The instruments of visibility similarly play a significant role for obtaining information and carrying out

6 Ofer Gal and Raz Chen-Morris argue that the instruments of the seventeenth century, such as the telescope and microscope, did not offer an extension and improvement to the senses, but completely replaced them, with the eye becoming the work of an instrument. Researchers completely relied on the authority of the instrument and Galileo understood it as mathematical in essence. Magnifying is a mathematical relation, which is performed by the telescope. Ofer Gal, Raz Chen-Morris, "Empiricism Without the Senses: How the Instrument Replaced the Eye", in: Charles T. Wolfe, Ofer Gal (ed.), *The Body as Object and Instrument of Knowledge. Embodied Empiricism in Early Modern Science, Studies in History and Philosophy of Science*, vol. 25, 2010, pp. 121–147.

nastalih na osnovi lastnega seciranja. A glavno zaslugo za znanstveno anatomsko kartografijo telesa pripisujemo Andreasu Vesaliusu, ki je v leta 1543 objavljeni *De Humani Corporis Fabrica* sistematično na novo predstavil človeško telo: okostje, mišičje, ožilje, živčevje, možgane, trahejo in bronhije, urinarni trakt, jajčnike in fetus. Ilustrativno in opisno je predstavil dotedanje zmote, temelječe na galenski vednosti o telesu, mestoma pa tudi sam ni bil točen (npr. v razumevanju ženskih reprodukcijskih organov in razlagi človeškega fetusa, pri čemer je izhajal iz pasje vrste). Vesalius telo predstavlja z več zornih kotov, tako da s tem gradi tridimenzionalno vizualizacijo, prikazuje pa tudi naravo tkiva, tako čvrstost kosti in razteznost mišic. Poleg tega Vesaliusovo zaporedje ilustracij prikazuje spektakel umirajočega telesa. Telo je vse bolj slečeno, razkrito, s tem pa tudi vse manj identitetno kot človeško telo, človek. Na prvih risbah človek z odrto kožo še stoji dostojanstveno in zre v daljavo, ob odklapljanju kit z okostja in izgubljanju mišic pa Vesalius človeka prikazuje v smrtnih mukah, dokler kadaver naposled nemočno ne obvisi obešen ob ruševinah, prispodobi razkrajajočega se človeka. V telesu so mišice pripete na kosti in mu omogočajo izvajanje gibanja, z izgubo te funkcije, ki je človeku esencialna, se ruši harmonija in idealna kompozicija telesa, s tem pa tudi sama ideja telesa in človeka. Prek odiranja telo izgublja svojo identiteto in se razgrajuje. Dekompozicija je dvojna: gre za razgrajevanje razkrajajočega telesa in za razgrajevanje telesa kot celote, kot ideala. Izpričani sta renesančni doktrini *mimezis* in lepo. Z raztopitvijo telesa postaja telo manj lepo, kar pomeni de-harmonizacijo in izgubo identitete telesa, katerega ideja je živo funkcionalno telo. Vesaliusu ne gre za posnemanje vidne pojavnosti opazovanega objekta. Njegovo izvajanje in prikazi so mnogo več kot to. Vesalius je raziskovalec telesa, njegove strukture, kompozicije, njegove narave. Njegovo raziskovanje je usmerjeno k odkrivanju bistva telesa, njegovih zakonov delovanja. Vizualni prikazi komunicirajo njegovo razumevanje telesa in človeka. Dozdevno vizualno posnemanje je močno posredovano z racionalizacijo. Slednja pa prihaja s procesom pridobivanja vednosti prek prakse seciranja.

procedures on the human body, yet Renaissance man attempted to understand the nature of man particularly by opening up the body. Dissection became a practice of learning about the body's anatomy, but it also acted as the basis for mapping the body. The Renaissance discovered the body in a similar way to discovering new areas of the world and it is therefore no coincidence that the Renaissance anatomy drawings coincide with the maps of the new world. The body was still uncharted territory, a world of unpredictable dimensions, as this is easier to understand in this day and age with the many projects focused on mapping the body: the genome, anatomy and brain. Leonardo da Vinci included 200 pages of anatomical drawings based on his own dissections in his *Treatise on Anatomy* (1489–1515). But the main credit for the scientific anatomical mapping of the body is attributed to Andreas Vesalius, who systematically reintroduced the human body in *De Humani Corporis Fabrica* published in 1543: the skeleton, muscles, circulatory system, nervous system, brain, trachea and bronchi, urinary tract, ovaries and foetus. He used illustrations and descriptions to present the errors of the time, which were founded on the galenic knowledge of the body, although he was not precise enough himself in places (e.g. in understanding the female reproductive organs and the interpretation of the human foetus being derived from the canine species). Vesalius presents the body from several angles, thus building a three-dimensional visualization, also showing the nature of the tissues, bone strength and muscle elasticity. In addition Vesalius' sequence of illustrations displays the spectacle of the dying body. The body is more and more unclothed, exposed, and is thus less and less identifiable as the human body, as man. In the initial drawings a man with skin removed stands in a dignified position staring into the distance, whereas when the tendons are deposed from the skeleton and the muscles removed, Vesalius shows man in deathly agony, until the cadaver eventually hangs helplessly on the ruins, a metaphor for man in his decomposing state. The muscles in the body are attached to bones, enabling movement. The loss of this function, which is essential to man, the harmony and the ideal composition of the body is destroyed, and thus the very idea of man and the body. By skinning the body, it loses its identity and begins to decompose. The decomposition is twofold: it is the breaking down of the decomposing body and the breaking down of the body as a whole, as the ideal. Attested are the Renaissance doctrine of *mimesis* and the beautiful. By dissolving the body, the body becomes less beautiful, which represents a de-harmonization and loss of the body's identity, the idea of which is a living functioning body. Vesalius is not concerned with imitating the visual appearance of the observed object. His execution and images are much more than that. Vesalius is a researcher of the body, its structure, composition, its nature. His research is focused on discovering the essence of the body, the laws of the ways in which it functions. The visual images communicate his understanding of the body and man. The apparent visual

Leonardo da Vinci poziva umetnike k zatekanju k naravi. Slikanje človeškega telesa je tudi zanj mnogo več kot zgolj posnemanje vizualne pojavnosti površin. Naturalistično držo renesančnih ustvarjalcev moramo razumeti globlje, ne zgolj kot težnjo k optičnemu podvajanju materialnega sveta. Metoda, ki jo zagovarja Da Vinci, je naslednja: »Najprej študirajte znanost, nato pa sledite praksi, ki izhaja iz te znanosti.«[7] Da bi slikar naslikal telo, mora poznati anatomijo, sestavo, dele, naravo tkiv, nadalje mora poznati napenjanje mišic v določenih pozicijah in zunanjo pojavnost razumeti v skladu s pozicijo in akcijo, pa tudi z ozirom na določeno telesno konstitucijo po starosti, spolu itd. Umetnik ve več, kot lahko neposredno vidi. Umetnik je na delu iskanja bistva, resnice. Slikarjeve

7 Leonardo da Vinci, *Treatise on Painting*, London: George Bell & Sons, 1877, člen 27, str. 10.

vizualizacije razkrivajo pravo naravo stvari, ne kažejo le njihovih površin.

Renesansa se pri svojem slavljenju vidnosti, razumevanju umetnosti, spoštovanju ideala harmonije in lepote opre na grško kulturno tradicijo. Stari Grki, zlasti Aristotel, prepoznajo posnemanje kot bistvo procesa učenja. Človek je bitje, ki je najbolj posnemajoče. Človek se prek posnemanja uči od matere Narave. Aristotel celo verjame, da »umetnost« dokonča, kar je Narava pričela. V skladu s tem je to, kar ustvari človek – duhovno ali kulturno – več od naravnega. Takšno bo kasneje tudi Heglovo razumevanje umetnosti. Po dolgotrajnem šolanju ob modelu Narave je posnemanje vredno, da se ga imenuje *technē*, ki pomeni proizvajanje in ustvarjanje v skladu z resnično idejo. Človek se odlikuje z edinstvenim orodjem, roko, s katero je pridobil kapaciteto, da izumi različne obrti. Obrti se pričnejo tam, kjer se ročna spretnost poveže z impulzom k posnemanju. *Technē* pomeni zvijačnost uma, da prelisiči naravo in jo obrne v človekov prid. *Mimezis* zato ne zagotavlja le užitka, ki ga sicer Aristotel zagovarja kot glavni cilj umetniških stvaritev, temveč se prek mimezisa sega po bistvu, ideji – v skladu s tem izkustvo umetnosti pravzaprav pomeni uzreti resnico. Za Aristotela je *mimezis* središčen za razumevanje katerekoli obrti (*technē*), vključno z medicino. *Technē* dela kot Narava v smislu, da si obe podrejata svoje proizvode teleološko, za svoje cilje. Še več, *technē* z dovrševanjem Narave prinaša več, kot je lahko izvršila narava. S tem sta si *technē* in delo Narave sorodna. Če je Platon že razumel »umetnost« kot tekmovanje z naravo, Aristotel še prida impulz k božanskosti. Aristotelov koncept *mimezis* ne pomeni le ponavljanja izoliranih stvari, temveč aktivni poskus sodelovanja v vzvišeni popolnosti.

Prav to razumevanje *technē* ustvarja osnovo za sodobno razumevanje tehnologije. S tega stališča tudi ni presenetljivo, da se ob aktualnih prospektih biotehnologije pogosto odpira vprašanje, ali se igramo Boga. V poznih osemdesetih letih dvajsetega stoletja je Vilém Flusser razmišljal o biotehniki in umetnosti, ki bi z njo operirala. Verjel je, da se bodo z biotehniko pojavila povsem nova umetna živa bitja, žive umetnine.[8] Če se je genetika s kombiniranjem elementov že dostopne genske informacije omejevala na variacijsko stvaritev, ki je ekvivalentna delu evolucije, se z biotehnologijo kaže tudi možnost za resnično stvaritev, je razmišljal Flusser. Ta se bo zgodila s tem, ko bo dodan novi element, šum, ki bo pridan proizvodnji nove informacije. Ob natančnejšem razmisleku o tem vprašanju v navezavi na metode sintezne biologije se takšno ločevanje dveh vrst stvaritev izkazuje za problematično. Za nas pa je vendar zanimiv Flusserjev zagovor »resnične« ustvarjalnosti. Ta pomeni delovanje, ki ni v skladu s programom narave, ki mu celo nasprotuje. Čeprav v svojih razmislekih o znanosti in umetnosti Flusser prihaja do sklepa, da med umetnikom prihodnosti in biotehnologom pravzaprav ni razlike, da je Disney prihodnosti molekularni biolog, pa po drugi strani

Renaissance artists must be understood more deeply, not only as a tendency towards an optical duplication of the material world. The method advocated by da Vinci is the following: "Study science first, then follow the practice that arises from this science."[7] For the painter to paint the body, he must have knowledge of anatomy, structure, components, the nature of tissue, further he must be aware of muscle tension in certain positions and must understand the external appearance in accordance with position and action, but also with regard to a certain physical constitution according to age, sex, etc. The artist knows more than he can directly see. The artist's work is to seek out the essence, the truth. The painter's visualizations reveal the true nature of things, they do not merely show their surfaces.

In its praise of vision, perception of art, respect for the ideals of harmony and beauty, the Renaissance relies on the Greek cultural tradition. The ancient Greeks, especially Aristotle, identify imitation as the essence of the learning process. Man is the creature that imitates most. Man learns from Mother Nature through imitation. Aristotle even believes that 'art' finishes what Nature has started. In line with this, what man creates – spiritual or cultural – surpasses the natural. This also comes later in Hegel's understanding of art. After a lengthy education following the model of Nature, imitation is worthy of being called *technē*, which means the production and creation in accordance with a true idea. Man is distinguished by a unique tool, the hand, by which he has acquired the capacity to invent various crafts. Crafts begin where manual dexterity connects with the impulse to imitate. *Technē* means the cunningness of the mind to trick nature and turn it to man's favour. *Mimesis* does not therefore only provide pleasure, which is in fact advocated by Aristotle as the primary objective of artistic creation, but grasps the essence, the idea through *mimesis* – in line with this, the experience of art actually means to catch sight of truth. For Aristotle, *mimesis* is central to the understanding of any sort of craft (*technē*), including medicine. *Technē* works as Nature in the sense that both subordinate their products teleologically in order to reach their goals. What is more, by perfecting Nature, *technē* brings forth more than nature could itself execute. This is what makes *technē* and the work of Nature similar. If Plato already understood 'art' as competition with nature, then Aristotle added the impulse towards the divine. Aristotle's concept of *mimesis* does not merely mean the repetition of isolated things, but rather an active

7 Leonardo da Vinci, *Treatise on Painting*, London: George Bell & Sons, 1877, art. 27, p. 10.

8 Vilém Flusser, »On Discovery«, v: *Artforum*, New York, letn. 27, št. 7, (marec 1988), str. 14.

koncept »resnične« ustvarjalnosti pomeni subverzivni akt. Odporništvo je sicer v prvi vrsti naravnano proti programu narave, a če biotehnologijo sámo razumemo kot aparat, kdo se upira njej? Kdo je tisti ustvarjalec, ki se upira vključitvi v mašinerijo, ki proizvaja variacije v programu biotehnologije? Ali ne bi ravno tako razumeli umetnika sodobnosti?

Robertina Šebjanič in Špela Petrič, po osnovni izobrazbi umetnica in biologinja, predlagata prav to – subverzivno stvaritev transvrste človeka in alge, *humalge*, ki bi človeku v težko predvidljivih razmerah na Zemlji omogočila boljše pogoje za preživetje. Ob predlagani genski hibridizaciji pa bi človek vendar obdržal človeško podobo, fenotip. Projekt predlaga »izboljšanje« človeka, ki pomeni načrt za ekstremno preživetveno strategijo. V okviru scenarija, ki se ga človeška vrsta boji, se bodo večjim ekološkim spremembam lažje prilagodili enocelični organizmi ali večcelični organizmi brez večje diferenciacije celic, kot imajo večje preživetvene zmožnosti bakterije in archeae. Partnerska vrsta človeku za ustrezen preživetveni načrt mu mora zato omogočiti hitro prilagoditev in po možnosti obstajati v mirujočem odskočnem stanju, npr. v endospori ali cisti, formi, ki bo zmožna zdržati ekstremne okoljske pogoje. Avtorici predlagata reprodukcijski cikel, v katerem diploidno telo alge prek mitoze proizvaja homosporo, namenjeno da postane polno izoblikovan človek. Prek mejoze, ki poteka v človeških genitalijah, se proizvajajo haploidne spolne celice. Po oploditvi zigota postane cista. Ta bo ohranila odskočno, napol mirujoče stanje v kompleksnem življenjskem ciklu, iz katerega se lahko pod želenimi pogoji razvije v algo. Kot ugotavljata avtorici, največji izziv predstavlja zagotovitev biološkega okolja, ki bi podprlo razvoj človeka. Za ta namen bi bilo možno materniko oblikovati iz starševske alge, ki bi delila hranljive snovi s človekom.

Robertina Šebjanič in Špela Petrič se zavedata, da ta načrt pomeni osvoboditev od etičnih načel in v tem smislu je njun projekt radikalen. Pa vendar se z obstoječim programom genskega inženiringa in sintezne biologije – pri obeh gre za gensko programiranje – približujemo načrtom za spreminjanje človeškega genoma. Pri tem je politika upravljanja tega programa usmerjena prav na izboljševanje kvalitet, ki bodo pomenile večjo odpornost do bolezenskih in drugih smrtnih groženj, kar v končni instanci pomeni podaljšanje življenjske dobe posameznika, s tem pa podaljšanje aktivne dobe populacije in v okolju, ki ogrozi vrsto, ne nazadnje tudi izboljšanje preživetvenih zmožnosti. Projekt se tako dotika vprašanja nuje človeške vrste, da uspe preživeti kot vrsta. Na tej točki se načrt za *humalgo* sreča z načrtom za odpravo človeka v vesolje, ki pravzaprav pomeni kolonizacijo novih okolij. Z ekspanzijo človeka v vesolje se vprašanje kvalitet te seleče se vrste ponovno zastavlja. Človek je edinstvena vrsta v razsežnosti *bios*, ki pomeni upravljanje z življenjem. *Bios*, politika življenja, se tu sreča s *technē* – zvijačnostjo uma, da prelisiči naravo in si jo podredi v svoj prid. Kako naj torej v sodobnosti razumemo, kaj pomeni biti človek? Prav s *technē* človek posega v svojo »naravo«, a ne šele z nedavno vednostjo-tehnologijo, ki smo jo poimenovali biotehnologija.

attempt of participation towards superior perfection.

It is precisely this understanding of *technē* that creates the basis for the contemporary understanding of technology. From this perspective, it is not surprising that in the face of the current prospects of biotechnology, the question of whether we are playing God often arises. In the late 1980s, Vilém Flusser was thinking about biotechnology and art, which would operate with it. He believed that along with biotechnology, brand new artificial living creatures, living artworks would appear.[8] If genetics limited itself to the variation of creation by combining elements that were already available as genetic information, which is equivalent to the work performed by evolution, then biotechnology must also indicate the potential for genuine creations, thought Flusser. This will happen at that point when a new element is added, noise, which will be included in the production of new information. On closer consideration of this issue in connection to the methods of synthetic biology, such a separation of two types of creation proves to be problematic. For us, however, Flusser's justification of 'real' creativity is nevertheless interesting. This represents a functioning that is discordant with nature's plan and is even in conflict with it. Although in his considerations on art and science Flusser arrives at the conclusion that there is actually no difference between the artist of the future and the biotechnician, that Disney is a future molecular biologist, the concept of 'real' creativity represents a subversive act. Resistance is primarily oriented towards nature's programme, but if biotechnology itself is understood as an apparatus, who is then resisting it? Who is the artist who refuses to join in the machinery that produces variation in the programme of biotechnology? Would a contemporary artist not be understood by the same token?

Robertina Šebjanič and Špela Petrič, an artist and a biologist by basic education, are suggesting precisely this – a subversive creation of a trans-species of the human and algae, *humalga*, which would provide humans with better conditions of survival on Earth in circumstances that may be difficult to predict. However, despite the proposed genetic hybridization, man would still retain the human form, phenotype. The project proposes to 'improve' the human being, which means a plan for an extreme survival strategy. In the scenario that the human species is most afraid of, single-celled organisms or multicellular organisms without significant differentiation of cells, like bacteria and archaea, will have greater survival ability and adapt more easily to major environmental changes. For his proper survival plan, the partner species of man should therefore be able to quickly adapt and possibly exist in a dormant state that can be reactivated, for instance in endosporē or cyst form, which will be capable of withstanding extreme environmental conditions. The authors propose a reproductive cycle in which a diploid body

8 Vilém Flusser, "On Discovery", in: *Artforum*, New York, vol. 27, no. 7, (March 1988), p. 14.

Težnja k izboljšanju kvalitet človeške vrste je prisotna prav v bistvu tega, kar razumemo kot svojo identiteto, kot človeško: je del naše kulture. Termin biotehnologija izpričuje ravno to – *technē bios* – obvladovanje in dizajniranje[9] življenja, ultimativni inženiring.

Vprašanj politik nad življenjem in telesom se dotika tudi Maja Smrekar. Njeno razmišljanje je postavljeno v kontekst verjetnega scenarija, po katerem se človeštvo sooča s svetovnim primanjkljajem hrane. Tokratni preživetveni načrt izkorišča človekov potencial proizvodnje molekul za prehrambne namene. Avtorica je ustvarila gensko spremenjen mikroorganizem *MaSm Saccharomyces cervisiae* tako, da je kvasovki dodala svoj encim. Med opravljanjem svoje prvenstvene preživetvene funkcije – fermentacijskim procesom – ustvarjeni metabolični sistem iz laktoze (mlečnega sladkorja) proizvaja mlečno kislino. Na ta način projekt zagotavlja proizvodnjo enega izmed najpogosteje uporabljenih aditivov v sodobni prehrambni industriji – mlečne kisline. V kontekstu utilitaristične družbe izkoriščanja človeškega materiala ne predlaga šele Maja Smrekar – umetnica ga predvsem dela očitnega. Izkoriščanju svojega telesa smo ne nazadnje priča ob vsakem medicinskem odvzemu biološkega materiala, ki se bo po potrebnih zdravstvenih raziskavah uporabil za raziskovalne namene (razen v primeru izrecnega nasprotovanja, če ima za to posameznik sploh možnost). V družbi, kjer je prav vse podrejeno privatizaciji in komercializaciji, se vprašanje lastništva in povezanega izkoriščanja lastnega telesa postavlja na novo. To nas ponovno privede do vprašanja oblasti nad življenjem. Michel Foucault je tehnologije biooblasti prepoznal kot anatomopolitike človeškega telesa – te se osredotočajo na telo kot stroj: na njegovo disciplíniranje, optimizacijo njegovih zmožnosti, izsiljevanje njegovih moči –, ter kot biopolitike populacije, ki se posvečajo telesu vrste, njegovemu razmnoževanju, nataliteti, mortaliteti, ravni zdravja in življenjski dobi.[10] Funkcija obeh polov oblasti nad življenjem, ki sta se pojavila v teku osemnajstega stoletja (prvi nekoliko prej in drugi nekoliko kasneje), ni bila več naravnana na ubijanje, temveč na investiranje življenja skoz in skoz. Forsiranje življenja, težnja k optimizaciji telesa in preživetveno načrtovanje nas ne privedeta le do razširitve pojma človeka, temveč tudi do humanizacije drugih življenjskih vrst. Maja Smrekar humanizira mikroorganizem za upravljanje preživetja človeške vrste, v nekem drugem scenariju pa človek izdeluje robota po modelu človeka s težnjo, da bi ustvaril super inteligentno bitje, ki bi naposled znalo delati še bolje kot človek. Sodobni *technē z mimezisom* se preveša v futuristični *technē*, v katerem

of algae uses mitosis to produce a homospore, intended to become a fully formed human being. Through meiosis, which takes place in the human genitals, haploid gametes are produced. After fertilization, the zygote becomes a cyst. This will preserve the semi-dormant state which can be reactivated in a complex life cycle, from which it can develop into algae under desired conditions. As the authors note, the biggest challenge is to ensure the biological environment that would support human development. For this purpose it would be possible to make a uterus from the parental algae, which would share nutrients with humans.

Roberta Šebjanič and Špela Petrič understand that this concept represents a stepping away from ethical principles, which makes their project radical. Nevertheless, with the current programme of genetic engineering and synthetic biology – both deal with genetic programming – we are homing in on the concept of modifying the human genome. Here the management policy of this programme is focused precisely on improving the qualities that will lead to greater resistance to disease and other death threats, which ultimately means the prolongation of the life of the individual, thereby also the prolongation of the active period of the population, and not least, the improvement of survival abilities in an environment that endangers the species. The project thus touches upon the necessities of the human species to survive as a species. At this point the *humalgo* plan meets the plan to send man into space, which actually represents the colonization of new environments. With the expansion of humans into space, the question of the qualities of this migratory species re-pose themselves. The human being is a unique species within the *bios* dimension, which means the management of life. *Bios*, the politics of life, here encounters *technē* – cunningness of the mind, in order to cheat nature and make it subordinate to itself for its own benefit. How should we then in contemporary times understand what it means to be human? It is precisely with *technē* that man interferes in his own 'nature', and not with his knowledge–technology, which has been called biotechnology. The aspiration to improve the qualities of the human species is present precisely in the essence of what we consider as our identity, as the human identity: it is part of our culture. The term biotechnology expresses exactly that – *technē bios* – the controlling and designing of life, ultimate engineering.

Questions on the politics of life and the body are also addressed by Maja Smrekar. Her thinking is put into the context of a likely scenario in which humanity is facing a global food deficit. This survival plan utilizes man's potential to produce molecules for nutritional purposes. The author has created the genetically modified micro-organism *MaSm Saccharomyces cervisiae* by adding her own enzyme to yeast. By performing its original survival function – the fermentation process – the generated metabolic system of lactose (milk sugar) produces lactic acid. In this way the project provides the production of one of the most widely used additives in the modern food industry – lactic acid. In

9 Slovenskima bralki in bralcu se opravičujem za uporabo te grdo zveneče tujke, vendar slovenski izraz oblikovanje ni ekvivalenten angl. izrazu *design*, ki poleg oblikovanja pomeni tudi namen, načrtovanje, določanje.

10 Michel Foucault, *The History of Sexuality. Volume I: An Introduction*, New York: Pantheon Books, 1978, str. 139.

je operativna in ustvarjalna neka druga vrsta, ne človek: namreč njegova stvaritev.

Temu programu se približujemo ne le z računalništvom, vejo, ki se je razvila po principu *mimezis* bioloških sistemov in ki, kot človek spoznava danes, svojega modela narave ni uspela preseči, temveč predvsem z vključevanjem samih bioloških sistemov v tehnološke sisteme. Preprost organizem sluzi je izkazal odlične inteligenčne sposobnosti v organizaciji transportnih in komunikacijskih mrež na danem teritoriju. V tej smeri se obeta možnost žive platforme, ki ima sposobnost življenjskega seljenja in upravljanja v okolju. Miceliji gob, ki jih s sodelavci (Andrej Gregori, Ajda Marič idr.) raziskujemo v tem oziru, predstavljajo nekoliko kompleksnejše biološke strukture, ki človeka učijo o inteligentnem delovanju in družbenem strukturiranju.

Renesansa je zastavila program razumevanja človeka, ki ga do danes še nismo zaključili, temveč se odpirajo vedno nove dimenzije te raziskave. A nekaj je ob tem postalo evidentno: stremimo za vednostjo, ki jo kartografsko organiziramo zato, da lahko z njo operiramo, aktivno delujemo, izvršujemo svoje gospostvo nad svetom. Podreditev, poseg, izkoriščanje in optimizacija osvojenega so inherentni sami težnji po odkrivanju, raziskovanju, po pridobivanju vednosti, po razumevanju. Vednost obstaja za *technē*. A pri vsem napuhu človeške vrste o svoji izjemnosti, spretnostni in intelektualni neprekosljivosti, celo božanskosti, kot ga potrjuje grška, nato renesančna in na tej sledi moderna miselna tradicija, se naposled vendar kaže, da smo zgolj ena izmed vrst, ki si prizadeva za lastno preživetje, pri čemer imamo v primerjavi s številnimi drugimi vrstami precej slabše možnosti.

the context of utilitarian society, Maja Smrekar does not merely propose the exploitation of human material – moreover, the artist makes it obvious. After all, we are witnesses to the exploitation of our own body every time we give a medical sample of biological material, which will be used for research purposes after the necessary health screening has been conducted (except where the individual expressly opposes this, if he even has the option to do so). In a society where everything is subject to privatization and commercialization, the question of ownership and integrated exploitation of one's own body presents itself as a novelty. This again leads us to questions of power over life. Michel Foucault recognized the technology of biopower as the anatomo-politics of the human body – these focus on the body as machine: on disciplining it, optimizing its capabilities, extorting its strengths – and as the biopolitics of the population dedicated to the body of the species, its reproduction, natality, mortality, level of health and life span.[9] The function of the two poles of power over life that occurred during the eighteenth century (the first slightly earlier and the second slightly later), was no longer oriented to kill, but to invest into life through and through. The forcing of life, the tendency to optimize the body and the planning of survival, do not only lead to the expansion of the notion of the human being, but also to the humanization of other living species. Maja Smrekar humanizes the micro-organism in order to manage the survival of the human species, while in another scenario man makes a robot modelled on the human being with the intention to create a super-intelligent being, which would eventually know how to *work* even better than man. The modern *technē* with *mimesis* is turning into a futuristic *technē*, in which another species, not man, is operative and creative: namely, his creation.

We are approaching this programme not only through computer science – a branch which has developed according to the principle of *mimesis* biological systems, and which, as man is finding out today, has not been able to surpass its model of nature – but especially by incorporating the biological systems themselves into technological systems. A simple slime organism has shown superior intelligence capability in the organization of transport and communication networks within a given territory. This direction promises the possibility of a living platform that has the ability to migrate and exert control within the environment. The fungal mycelia, which we are investigating with colleagues (Andrej Gregori, Ajda Marič, et al.), in this respect represent slightly more complex biological structures that teach humans about intelligent functioning and social structuring.

The Renaissance started its programme to gain understanding of man, which has not seen its end up till today, yet ever new dimensions of this same research continue to open up. But something has

9 Michel Foucault, *The History of Sexuality. Volume I: An Introduction*, New York: Pantheon Books, 1978, p. 139.

become apparent in all this: we strive for knowledge, by mapping and organizing it, so that we can use it to manipulate, function actively, exercise our dominion over the world. Subjugation, invasiveness, exploitation and optimization of the conquered are inherent to the tendency itself to discover, explore, gain knowledge, understand. Knowledge exists for *technē*. But in all the vanity of the human species about its extraordinariness, all its unsurpassable skills and intellectual prowess, even divinity, as confirmed by the Greek – and later the Renaissance, followed by the modern – tradition of thought, it nevertheless seems at the end, that we are merely one of the species striving for its own survival, in which we do not stand as much chance as many other kinds.