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Authors

Delfanti, Alessandro
Castelfranchi, Yuri
Pitrelli, Nico

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“What Dr Venter did on his holidays”: exploration, hacking, entrepreneurship in the narratives of the *Sorcerer II* expedition

Alessandro Delfanti^{a*}, Yuriy Castelfranchi^b and Nico Pitrelli^c

^a*SISSA and University of Milan, Italy;* ^b*Department of Sociology and Anthropology, Federal University of Minas Gerais, Brazil;* ^c*ICS, Interdisciplinary Laboratory, SISSA, Italy*

The *Sorcerer II* is the highly mediatized and spectacular Venter Institute’s ship that circumnavigated the planet between 2003 and 2006 to collect and classify marine microbial genomes. We analyze Craig Venter’s public communication activities and strategies especially focusing on the images of science and scientist he proposes: that of an eighteenth-century “savant” and nineteenth-century naturalist devoted to the exploration of new worlds, and that of the hacker, hero of informational capitalism. Emphasizing his independence from both academy and industry, but building strong alliances with both spheres and with the media, Craig Venter sails the oceans of the contemporary biotechnologies’ market, interpreting a specific typology of the relationship between science and society, enterprises, universities.

Keywords: public communication of S&T; images and representations of science; genomics and the market

Introduction

In the past few decades the relation between science and media has found in biotechnologies an optimal laboratory field to test hypotheses on the changes in science–society interactions.¹ However, we believe there is an aspect that has not been deeply explored: the birth of new hybrid figures such as scientists-politicians, scientists-entrepreneurs who want to be part, at the same time, of both the academic community and other social groups. Recent works in the social history of science have highlighted how simplistic is the enduring image of scientists not interested, for instance, in money and economic matters. Industrial secrets, patents and other forms of enclosure are not peculiar to twenty-first-century research, while open sharing practices were never limited to academic science. Both systems of managing information and knowledge were broadly used by industrial and academic actors during the twentieth century (Shapin 2008).

Corresponding author. Email: delfanti@sissa.it

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Furthermore, many scholars have emphasized that the current configuration of technoscience is characterized by more complex negotiations and conflicts between consumers, social movements, enterprises and academic research.² Outside the field of science studies, this reconfiguration was depicted with very diverse labels: “post-industrial society”, “knowledge society”, “informational capitalism”, “reflexive modernization”, and so on. However, such diagnoses share some elements, such as the centrality of the media and communication. This has deep implications for public communication of science (Bucchi, 1998, Greco 2002, Castelfranchi and Pitrelli 2007). This work aims at showing how, through his public image, the American biologist Craig Venter embodies these changes, being only the tip of the iceberg of a new model of science–society interaction, rooted in the spheres of marketing, commercialization and communication.

After his beginnings as a “public” scientist working at the National Institutes of Health, from which he withdrew in 1991, Venter founded TIGR (The Institute for Genomic Research) and Celera Genomics, the private firm that sequenced the human genome in 2000. He became a symbol of a new kind of scientist/entrepreneur, portrayed in the famous photograph published on the cover of *Time* magazine. But the exit from Celera in 2004 and the consequent founding of J. Craig Venter Institute and Synthetic Genomics, Inc., correspond to a new phase in his career, in which Venter switched to more applied research, such as synthetic and personal genomics, and to a new socio-economical configuration.

Several scientists make strong use of the media, are entrepreneurs and invest energy in developing links with politics and industry. But few decide to live in as many territories as Craig Venter did, or are able to build public communication practices in which they assemble rhetoric blocks coming both from classical elements and typical contemporary leitmotifs.

Based on data coming from an in-depth discourse analysis, we focus attention on the media production linked to one of the most recent enterprises by Venter: the expedition of the *Sorcerer II*, a research vessel operated by the J. Craig Venter Institute. The event received wide media coverage and we collected the major international communication output that dealt with the *Sorcerer II* since the beginning of its voyage in Spring 2003 up to the publication of the first set of results in Spring 2007: our sources include websites, press articles, TV programs, documentaries, interviews, scientific publications, books.³

Other scholars have addressed the *Sorcerer II*'s case: Alain Pottage (2006) analyzed its effects in the process of bio-prospecting, while Stefan Helmreich (2007) studied it as a means to virtualize and deterritorialize oceanic genetic resources. However, through the analysis of the relation between the *Sorcerer II* and the media, we want to show the characteristics of the specific image of “scientist in public” represented by Venter. Furthermore, we will provide evidence that the public communication by Venter and other biotechnologists is anything but a powerful instrument in the debate on the limitations, opportunities and interests to be favored in today's biology.

1 The *Sorcerer II*

The *Sorcerer II* is a 95-foot sloop designed to be a sports craft and turned into a research vessel operated by the J. Craig Venter Institute in the Global Ocean Sampling expedition, a circumnavigation of the Earth carried out to collect and sequence the genomes of marine microbial organisms. The *Sorcerer II*, funded also by the Moore Foundation, the US Department of Energy and Discovery Channel, sailed for thousands of miles stopping periodically to collect microbial material from the oceans' waters. After a brief expedition into the Sargasso Sea in Spring 2003, the journey of the *Sorcerer II* set out officially from Halifax, Nova Scotia, in August 2003, wending its way into the Gulf of Mexico, on to the Galapagos Islands, past Australia and to South Africa. The vessel returned to New England in January 2006, after sailing for 17 months. The samples collected were sent to the Venter Institute of Rockville Maryland for sequencing. With its 6.5 million genetic sequences analyzed and 6.3 billion base pairs catalogued, the expedition created the widest metagenomic database in the world, called CAMERA (<http://camera.calit2.net>), and gave birth to a publication in *Science* (Venter *et al.* 2004) and a special issue of *PLoS Biology* (Parthasarathy *et al.* 2007). The scientific objective of the *Sorcerer II* mission was to collect and to catalogue an unprecedented quantity of "genes" to be used in artificial biology projects.

The *Sorcerer II* expedition was accompanied by a great effort of communication to the general public through different types of mass media. We have identified public communication methods which are common in most part of the contemporary research projects, such as press conferences and press releases, but also direct interaction with the general media such as the case of the documentary shot by Discovery Channel on board the *Sorcerer II* (Conover 2005). The website for the expedition contained a tracker allowing users to follow the route of the vessel, informing them on its real-time position. James Shreeve, a *Wired* journalist and biographer of Craig Venter (2004a), went on board the *Sorcerer II* to write an article (2004b) published as a cover story in the *Wired* issue of August 2004.

The JCVI (2006) presented itself as an institution able to leave the ivory tower to appeal to the citizens, by stating its aim to devote itself not only to the advancement of the science of genomics but also to "the communication of those results to the scientific community, the public, and policymakers", putting research and public communication on an equal footing.

2 Public images of genomics and ICT

The public history of contemporary biotechnologies, especially bioinformatics, has a milestone in human genome sequencing, one of the most mediatized scientific projects ever (Henderson and Kitzinger 2007). Although the informational DNA metaphors (the book of life, the code) date back to the origin of modern genetics, many scholars have dealt with the analysis of the role played by the Human Genome Project and by the Celera Genomics of Craig Venter himself

in establishing a model of genetics based on information technologies and in its impact on the practices linked to intellectual property and to the size of the contemporary genomics market (Hilgartner 1995, Kay 2000). Kay maintained that “genomic textuality” had become crucial not only for the scientific development of genomics, but also for its commercial development. Other scholars have analyzed the economic transformations linked to the post-genomic era and the information flows marking it, arguing that it is a new form of biocapitalism (Franklin and Lock 2003, Sunder Rajan 2006). Within this model, many scholars have identified not only the technological and economic link between contemporary genetics and ICT (see e.g. Groenewegen and Wouters 2004), but also a paradigm for research and development linked to information technologies, that “increasingly replaces one dominated by the technologies and organisations of mass production and consumption” (Gibbons *et al.* 1994, p. 125). More generally, several scholars stressed the significant role, both from the epistemic and socio-economic point of view, played by the “cybernetic turn”: a turn to translating world, genes and bodies into code (Waldby 2000, pp. 43 and 121), where informational pattern is privileged over materiality and incorporation of information on a biological substrate is only a contingent event. Using Haraway’s words (1991, p. 164):

communications sciences and modern biologies are constructed by a common move – the translation of the world into a problem of coding, a search for a common language in which all resistance to instrumental control disappears and all heterogeneity can be submitted to disassembly, reassembly, investment, and exchange.

Major works have been published on the public images linked to biotechnology, and they include Kay (2000), Keller (2000), Nelkin and Lindee (1995). Other scholars have focused in particular on the images and metaphors of the post-genomic era. Michael Fortun (2001, 2005) has identified in the promises made by contemporary genomics the speculations on possible future scenarios, also by studying other highly mediatized biotechnologists, although different from Craig Venter, such as Kari Stefansson and James Watson. Liakopoulos has dealt with the public images of the great biotechnological research projects such as the human genome sequencing, identifying some recurrent frames into which the most frequent metaphors are grouped. In particular, he highlights the importance of the metaphors linked to the idea of “progress”, which present biotechnologies as a revolution that “denotes a sudden break with the status quo and a fast rate of social change that, although dubious about the final effect” announces “the violent change from the pre-existing order into a new, promising era” (2002, p. 10). Nerlich and Hellsten (2004, p. 266), on the other hand, have defined the presence of metaphors linked to the human genome project as a “treasure” or a “landscape of opportunities” which should be explored: “The metaphors of science as an adventurous journey, in which scientists venture forth onto a new ‘plain’ [...] with their trusted, but now seemingly complete, map in hand” seem

to carry the greatest promises of the future of genomics. We could trace all these images of biotechnology also in the public story of the *Sorcerer II*. Actually, these are general and hegemonic commonplaces in the discourse of contemporary science. On the one side, as Haraway (1988) says, western science continues to be an important literary genre of exploration and travel. On the other side, as pointed out by Rabinow (1999, p. 17) the argumentation that, with science and progress, our “future is at stake”, is crucial in the contemporary narratives, especially in life sciences. Venter seems able to feel the possibilities hidden in such metaphors and rhetorical topoi, and to transform each leitmotiv in an epistemic tool, a powerful political argument, or a marketing trick.

3 Beyond Darwin

The *Sorcerer II* mission is explicitly placed in the long tradition of the scientific research voyages, which include, among others, the expedition of the *Beagle* of Charles Darwin and of the *Challenger* (Gross 2007, JCVI 2004b), an oceanographic expedition that circumnavigated the globe between 1872 and 1876, stopping every 200 miles to examine the marine waters searching for unknown organisms, precisely as the *Sorcerer II* did.

Thus, one of the images of science put forward by the *Sorcerer II* is the one of the “savant” explorers, scientists who carry out research outside laboratories and academia. Their enterprises take place within nature in an effort to discover the mightiness and the spectacular features of the universe which coincides with the exploration of the world and the shift in the frontiers of human knowledge. Their dedication to research is all-encompassing and their groundbreaking goals are not only economic, but also scientific ones. The participation of Discovery Channel fell within its *Discovery Quest* program, an initiative to fund a “new generation of scientific discoveries”, as the website of the TV channel maintains. It is about funding forefront “researchers and explorers” (and in the case of Venter the two figures overlap). Their feats should be told so that they can capture the “genius, obstacles and happiness” of moments of revelation so strong that they can “change science” (Discovery Channel 2005).

On 4 March 2004, the Venter Institute held a press conference to present the study published in the *Science* issue of that week, describing the first set of data on the samples collected in the Sargasso Sea. The day after it was in the newspapers all over the world. During the press conference, Craig Venter announced that at that very moment his *Sorcerer II*, converted into a research vessel, was at the Galapagos Islands, spurring journalists to underline the link between his voyage and Darwin’s one. The *Wired* headline on the cover explicitly mentioned the most important work by Charles Darwin: “Craig Venter’s epic voyage to redefine the origin of the species” (Shreeve 2004b). Also *Science* and *PLoS Biology* highlighted the similarities between the voyage of the *Sorcerer II* and the *Beagle*. One of the images published by *PLoS* shows Craig Venter at the Galapagos, posing next to the

Estación científica Charles Darwin. The exploration was associated with the discovery of unknown worlds and with the achievement of wonderful scientific objectives:

there was obviously an unknown and unseen world in the oceans that could be vital to better understanding diversity on the planet, as well as potentially solving some of the planet's growing environmental issues, such as climate change. (Shreeve 2004b)

Likewise, all the narrations on the Global Sampling Expedition underlined the comparison with Darwin's voyage, as demonstrated by this excerpt from *Wired*: "He wants to play Darwin and collect the DNA of everything on the planet" (Shreeve 2004b). Also in the documentary produced by Discovery Channel (Conover 2005) the image of the explorer of new worlds makes an appearance. Craig Venter is examining a map before exploring a tropical island, with the ocean behind his back. Equipped as a scuba diver, he plunges into the waters of the Cocos Island while the voice-over says: "Strange things from deep within the Earth are happening [...] and Craig Venter is here to investigate". To illustrate the images of the website of the Global Ocean Sampling Expedition,⁴ there is a quotation from Khalil Gilbran: "In one drop of water are found all the secrets of all the oceans".

However, although the concept of explorer embodied by Venter may seem more imaginative than real life, his scientific objectives are focused on the most urgent issues of our time: "Craig Venter is starting to wonder if the food we eat and the air we breathe might not come from the place we think", and has embarked on "a global voyage of discovery that might impact you and your neighbourhood's fueling station", as stated by the Discovery Channel documentary (Conover 2005), while the images go from the ocean to a Shell gas station where Venter arrives driving a hydrogen-fueled car, to fill up the tank with clean and free energy. "Future engineered species could be the source of food, hopefully a source of energy, environmental remediation and perhaps replacing the petrochemical industry" (Venter 2005b). Indeed, bacteria "are the dark matter of life. They may also hold the key to generating a near-infinite amount of energy, developing powerful pharmaceuticals, and cleaning up the ecological messes our species has made" (Shreeve 2004b).

Yet Craig Venter does not limit himself to using and underlining the analogy with Charles Darwin; he wants to go *beyond* Darwin, thanks to the technical instruments he has at his disposal and to his special view of the natural world: "We will be able to extrapolate about all life from this survey. [...] This will put everything Darwin missed into context" (Shreeve 2004b). The enterprise by Venter, indeed, has all the instruments to trace "All life on Earth. And his journey is just begun". Indeed, the *Sorcerer II* has found "more species in one sample area than *Challenger* found in its four voyages around the entire planet" (Conover 2005).

So, while Venter plunges into the waters of Galapagos and approaches an iguana, the voice-over says: "now Craig Venter visits this ecosystem swimming with Darwin's subjects and collecting life invisible to the instruments of the 1830s"

(Conover 2005). If Darwin's work drove a change in the way we see the world, "Venter is hoping these marine data will do the same in years to come" (Nicholls 2007).

4 Cracking the ocean code

The images offered by Venter are rich in references to his role of information scientist, another type of explorer of new worlds. We have related the metaphors about the use of information to a special figure who summarizes these characteristics of the public image of Venter: a hacker. Indeed, biotechnology genesis overlaps the hacker's one. For example, they share birth places (Mit, Bay area) and roots in 1960s and 1970s new left and counterculture (on informatics see Barbrook and Cameron (1996) or Turner (2006), on biotechnologies Vettel (2008)). Craig Venter (2005b) refers to genomes using IT-related metaphors: "this is actually just a microorganism. [...] We need to know his operating system". His objective indeed is to "create the Mother of all databases" (Shreeve 2004b), because "genomes are like software code. Like code, genomes can be mapped" and recorded in a disk: "from life . . . to a disk", becoming "digital code ready for computer processing" (Conover 2005). Life is genetic information, and the scientist managing to unveil its code using the IT means of contemporary biotechnologies will be able to grasp its secret and to exploit it to the benefit of all humankind. Indeed, the hacker is a discoverer of codes, of secrets guarded by coded languages that may turn out to be useful, wonderful, surprising. In the logo used by *PLoS Biology*, the *Sorcerer II* sails a sea made of A, T, C, G, the initial letters of the four nucleobases that make up the DNA code, and we should "join him in his attempt to change our planet future by cracking the ocean code" (Conover 2005). In the IT jargon "to crack" means to unveil an encrypted code, a metaphor already found in other studies on the public images of biotechnologies (see Davies 2002). Cracking is what hackers do when they violate the access to a system. The ability of hackers, indeed, is based on their skills to manage and manipulate information. Even the *Sorcerer II* is trying to crack a code that must be unveiled, also without knowing its immediate use.

But the hacker metaphor is not related only to cracking information. As in the case of the founding myths of the hackers' world, there is no need to find an application for decrypted codes. "We found 20,000 new proteins that metabolise hydrogen in one way or another. 20,000!"; "We're just trying to figure out who fucking lives out there"; and the genetic code is a "source of power" (Conover 2005) in itself: "If I could boost our understanding of the diversity of life by a couple orders of magnitude and be the first person to synthesize life? Yeah, I'd be happy, for a while" (Shreeve 2004b). In the 1970s, Capitan Crunch was one of the first hackers able to break into the American telephone network, and is still today a mythical figure of the hacker iconography. He acted not for money, but for the eagerness to know the codes managing the network, which he revealed to everyone, along with the

tricks to use them (Levy 1984). Hackers feel a deep hatred against code restrictions: they do not tolerate the prohibitions that prevent them from accessing the information that makes up the program instruction. But besides the focus on pure information and open access, the hacker ethic is multiform. The hacker is not only independent, curiosity driven, innovator, dedicated to sharing his knowledge, but also a heretic, a rebel against institutions and a resource ready to be sold to venture capital (a famous account of hacker ethic is Himanen and Torvalds 2001; for others see e.g. Kelty 2001, Jesiek 2003, Ippolita 2005).

In Craig Venter's voyage, information is depicted as a goal in itself, an adventure experience, and stopping people trying to improve its understanding or acting directly on its mechanism implies a dictatorship. Besides highlighting the importance of "bare" information, in the narration on the *Sorcerer II* the taste for discovery is mixed with the pleasure of life, another typical ingredient of the hacker style. Indeed, the driving forces to a hacker are curiosity and freedom. Their desire for knowledge and self-management in their work makes amusement an important component of their activities, whereas to their eyes bureaucracy and institutions acquire a negative image. When some critics remarked that he should have used a proper and real research vessel, and not his pleasure sailing boat, which "looks and feels pretty much like a luxury yacht" (Shreeve 2004b), Venter replied he wanted to "combine work with pleasure", sarcastically underlining that he "will be joining the vessel very soon to head to French Polynesia. It's tough duty."⁵ The headline for the article on the *Sorcerer* published in the *Economist* is: "What Dr. Venter did on his holidays" (Economist 2007). After all, the expedition left from Halifax in New Scotland because Venter "had never sailed that far north and wanted to see what it was like" (Shreeve 2004b).

Wired, the magazine that sent a journalist on board of the *Sorcerer II*, also contributes to this image of a scientist. *Wired* embodies the "Californian ideology" (Barbrook and Cameron 1996) of the Silicon Valley, a model of relation between research, technology, society and capitalism born in the garages in which young hackers develop their digital creativity and in the headquarters of the venture capitalists, ready to pour millions of dollars into innovative projects with a high social relevance. Craig Venter has also had direct contacts with the IT innovation companies. In *Google story*, David Vise and Mark Malseed tell about the meeting between Craig Venter and Larry Page and Sergey Brin, the two founders of Google. Today, according to Venter's vision, the real challenge of biology is to organize and analyze the huge quantities of data contained in the genetic databases, and "Google's mathematicians, scientists, technologists, and computing power had the potential to vault his research forward" (Vise and Malseed 2006, p. 285).

5 Captain Hook is giving the treasure

However, hackers also have a business model and a reference market, and Craig Venter is well known for having adopted secrecy and privatization policies for

genetic data. With his Celera Genomics he had challenged the rules of academic science, forcing *Science* to change its publication standards, allowing him to publish the articles on the human genome without making all the genetic data public (Castelfranchi 2004). But industrial secrets, intellectual property rights and service providing based on open access data are three major modes of making money from biological information. The three are actually crucial in life science today (as well as in software and ITC), but their respective weight changes and oscillates dramatically with time and in different areas. Fear of anti-commons effects, national and international regulation, market demands and public opinion are some among several factors that influence the choices of what, when and how to appropriate knowledge in life sciences (Mills and Tereskerz 2007).⁶

Indeed, if already while working at NIH Venter was at the center of a furious polemic – NIH having filed in 1991 two patent applications claiming 4000 of fragments of human DNA (ESTs), with Venter as the inventor – today he also insists on aggressive patenting tactics: the recent scandal over the broad patent on “synthetic microbe” filed by the JCVI (2007) is just one example. In the case of the *Sorcerer II*, the issue of making money from information remains at the heart of the scene, yet Venter has chosen here a different stance (Pottage 2006, Rai and Boyle 2007), deciding to release all data in the public domain and to publish the main results in *PLoS Biology*, a journal leader of the open-access movement. Craig Venter has underlined many times that he intends to produce data that anyone can freely explore “from their desktop” and “publicly available to researchers worldwide. [...] No patents or other intellectual property rights will be sought by the Institute on genomic DNA sequence data” (JCVI 2004a).

Nonetheless, biopiracy accusations came almost immediately (see Pottage 2006), when Ecuador and French Polynesia, whose territorial waters were crossed by the *Sorcerer II*, opposed the sampling because they feared it was an attempt to exploit their genetic resources. An agreement was reached between the Polynesian authorities and Venter himself after lengthy negotiations with the French government. In the meantime, Craig Venter was criticized with the document *Playing God in the Galapagos* by the non-governmental organization ETC Group (2004) and was also nominated by the American Coalition Against Biopiracy (2006) for “Greediest Biopirate”, winning the Captain Hook Awards 2006 “for undertaking, with flagrant disregard for national sovereignty over biodiversity, a US-funded global biopiracy expedition” on “his pirate ship”.

And yet, Craig Venter presented himself as a defender of open access to scientific data, and rejected the biopiracy accusations: he is “giving everything away” and “doing everything he can to convince the world that he has no commercial motive: *Here, take it all, I ask for nothing in return.*” “The irony is just too great [...] I’m getting attacked for putting data in the public domain” (Shreeve 2004b).

Furthermore, science as a whole was presented as under attack, as well as its path in the progress towards new frontiers of knowledge. In the Venter discourse, anti-scientific obscurantism occurs when a scientist is forced to “navigate the complex

legal territory [...] ‘If Darwin were alive today trying to do his experiments, he would not have been allowed to,’ says Venter” (Nicholls 2007). The comparison with Darwin’s voyage is thus publicly used also to reject the accusations on the expedition: “If it’s in the Darwin school of biopiracy, then fine” (Nicholls 2007). Here, the future is at stake: “If you do not perceive the possibilities in this shift, if you say *no* instead of *yes*, you will be left in the past. There will be whole societies who end up serving mai tais on the beach because they don’t understand this” (Shreeve 2004b).

The solution to the problem of the short-sightedness of governments and NGOs that want to defend their genomic and biodiversity resources from the passage of the *Sorcerer II* lies in Venter’s capacity to connect to the world of politics and, when needed, to mobilize it: “He didn’t sound too worried. He had already enlisted the French ambassador to the US to lobby Paris on his behalf, and some top French scientists were writing letters of protest to the ministry” (Shreeve 2004b).

Therefore, Venter’s narrative with respect to intellectual property is different here from the one he shows in other strategic fights. This change is also brought about by the shifts that have occurred in the meantime in the realm of genomics: the largest databases in the world are now open access, and private enterprises rather sell services linked to the management of raw data. Indeed, the business model put forward by Venter is linked to a service economy. Open source software corporations such as Sun Microsystems or IBM (Benkler 2006) may be his model: companies that guarantee an access to their codes to everyone and sell their services, training, customizations without adopting a monopolistic management of information. An open source informational model of capitalism that often reappears in the public narrations on the expedition of the *Sorcerer II* and that is presented as a crucial instrument for innovation. In the twenty-first century, the gift economy is embodied in the Net, in its emphasis on access, participation, gratuity. It has become a new economic model (Barbrook 1998, Rullani 2004) and a leverage that web, software and hi-tech firms use in order to appropriate the value produced by free online cooperation. Gratuity and open source are now models for capitalistic exploitation, and not just two paradigms of scientist’s ethos.

7 In the open ocean

None of the images evoked by Venter are innovative, yet innovative is the recombination Venter makes of them. So, making use of different strata and levels in the complex repertoire of popular imagery on scientists, recurring to several strong metaphors, rhetorical topoi and discursive leitmotiv, Venter manages to embody multiple figures and stereotypes of a scientist: the “savant” explorer of the seventeenth to nineteenth centuries and the hacker of the third millennium, the “amateur”, the curious searcher of the truth enacted during the construction of academic science, and the ambitious, proactive, individualist *homo oeconomicus* of the knowledge society. The analysis of the mediatic narrations on his work

shows a self-portrait in which an ambitious, brave, restless bio-entrepreneur manages to get free from institutional and bureaucratic constraints typical of twentieth-century science, bypassing what is considered as the “classical” figure of a modern scientist: linked to academia, disinterested, far from mingling with society and the market, belonging to a global scientific community made up of peers. Or rather, explicitly belonging to the sector of industrial research and development, yet external to the stronghold of “high” science: “My greatest success is that I managed to get hated by both worlds”, Venter says (Shreeve 2004b).

In Venter’s history most of these images are hardly new: his withdrawal from the National Institutes of Health in 1991 and from Celera Genomics in 2004 have allowed him to say he does “any kind of science” he wants “without obligation to an academic review panel or a corporate bottom line” (Shreeve 2004b). Venter’s science is embodied also by the status of the institutions led by him: on the one hand, the J. Craig Venter Institute, a non-profit organization, on the other hand Synthetic Genomics Inc., a company whose aim is to market (and, eventually, patent) the results of research projects on synthetic life. His economic purposes, however, are always made explicit. As *Wired* has reported, being accused of pursuing fame and fortune, Venter “cheerfully agreed” (Shreeve 2004b).

So in the narrations on this research project, having left academic science and the industrial one aside, the *Sorcerer II* can finally sail the complex waters of informational economy and network society. In its voyage, the ship has embarked, metaphorically or having them installed on board, with IT technologies to sequence and to store data, biological machinery, journalists, cameramen, bioinformatics scientists, technicians, public research agencies, universities, startups, biologists, ambassadors, renowned scientists, non-profit foundations, and private companies.⁷ Contemporary biotechnologies, indeed, require the creation of large and varied hybrid collective groups which should make them multidisciplinary (see e.g. Rabinow 1999, Gibbons *et al.* 1994), connect them to private and public capitals, and direct them towards the social needs expressed either by semi-public actors, such as foundations, or by society in a broad sense. Public communication is one of the tools by which these collectives negotiate their interactions. The *Sorcerer II* communication case does not represent a break in the norms regulating the production of scientific knowledge, but it is an expression of the changes going through it and affecting public communication of science. Venter is excessive, also and perhaps especially in the case of his vessel: he represents a science turned into a show, highly mediatized, barefaced as regards its objectives and capable of using sophisticated marketing instruments to discuss its work in the public arena, to legitimize it and to give credit to its promises and results. Yet, though excessive and extraordinary, apparently he is not a symptom of an illness in the relation between science and society, but rather an expression of its present physiology in a strategic area of technoscience such as biotechnologies.

During the years in which the voyage of the *Sorcerer II* took place, Craig Venter was the promoter of other highly mediatized research projects,⁸ acquiring credit

among the general public as one of the world's most renowned scientists. Yet the scientific and media stage has seen the appearance of other biotechnologists using the same metaphors, exploiting the same images of science, keeping their balance on information disclosure and privatization, and exploiting in the same way the media and the Internet. The examples that appeared in the mass media in the period analyzed in this paper include the "open source junkie" George Church from Harvard, also nicknamed "information exhibitionist", given his attitude for a total data disclosure, director of the Personal Genome Project and involved in many startups in the field of genomics. Another is Drew Endy of the MIT Biobricks Project, with his ideas for "DNA hacking", which he has presented also on public occasions such as the Chaos Communication Congress of Berlin, one of the most famous hacker gatherings of the planet.⁹ The Icelandic deCODE Genetics (2007) of Kari Stefansson sells customized genomic services with the motto "Know your code", "discover the secrets of your DNA" and "take a voyage of discovery". 23andMe (2007), the Google genomic startup, urges you explicitly: "Unlock the secrets of your DNA. Today", and its founders, Anne Wojcicki and Linda Avey are venture capitalists and aspiring science entrepreneurs. The Spencer Wells' Geographic Project,¹⁰ a massive collection of genomic data started in 2005, is a joint venture between National Geographic and IBM, and it gathers dozens of universities and research centers all over the world. This project, half scientific journey, half media production, is based on the selling of a personal DNA testing kit whose results are made publicly available through an open source database.

Also in these cases, which present communication practices open to a more in-depth study, apparently the informational and promissory metaphors surrounding genomes are not a heuristic artifice, but they feed on the changes in the figure of a biotechnologist which uses communication to acquire credit as if he were a manager of genetic information, a provider of customized services, a direct interlocutor with the needs of citizens, interpreting the shifts in the informational capitalism and in the relation between biotechnologies and society.

Those scholars who have analyzed the discourse practices of post-genomic biotechnologies have underlined the importance of these narrations. Michael Fortun (2001, p. 145), for example, who has studied the case of deCODE Genetics, stated that the value of the new genomics companies are "story stocks" dependent not only on genetic technologies but "on that other set of technologies for simultaneously producing and evaluating anticipated, contingent futures: literary technologies". Also the narrations on the *Sorcerer II* suggest a scientific, communicative and economic model, as well as a horizon to look at: the future.

Notes

1. See, for example, Durant *et al.* (1998) and Bauer and Gaskell (2001).
2. See, for different approaches and analysis on the actual reconfiguration of such relations, Nowotny *et al.* (2001) and Ziman (2000).

3. American Coalition Against Biopiracy 2006; Conover 2005; Economist 2004; Economist 2007; Eisen 2007; Gross 2007; J.Craig Venter Institute 2004a; J. Craig Venter Institute 2004b; J. Craig Venter Institute 2006; Nicholls 2007; Parthasarathy *et al.* 2007; Pollack 2007; Shreeve 2004b; Singer 2007; Venter 2005a; Venter 2005b; Venter 2007; Vise and Malseed 2006; <http://camera.calit2.net>; www.sorcerer2expedition.org
4. www.sorcerer2expedition.org.
5. Press conference of 4 March 2004, quoted in Pollack (2007).
6. On secrecy, see Louis *et al.* (2001), Blumenthal *et al.* (1996); on anti-commons, Heller and Eisenberg (1998); on the problems posed by the use of information contained in databases for the advancement of science, see Gardner and Rosenbaum (1998).
7. The scientific institutions, public and private ones, appearing in the scientific articles published by *Science* and *PLoS Biology* are: J. Craig Venter Institute (JCVI); California Institute for Telecommunications and Information Technology (Calit2); University of California San Diego (UCSD); University of California Irvine; UCSD's Center for Earth Observations and Applications; San Diego Supercomputer Center; University of California Davis; Department of Biological Sciences, University of Southern California; Your Genome, Your World; Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México; Department of Oceanography, University of Hawaii; Bedford Institute of Oceanography; Smithsonian Tropical Research Institute, Panama; Departamento de Oceanografía, Universidad de Concepción, Chile; Universidad de Costa Rica; Department of Environmental Sciences, Rutgers University; Department of Earth Sciences, University of Southern California; Razavi-Newman Center for Bioinformatics, Salk Institute for Biological Studies; Burnham Institute for Medical Research; University of California Berkeley; Physical Biosciences Division, Lawrence Berkeley National Laboratory; Brown University.
8. E.g. the sequencing and the publication of his own genome, which inspired him to write his autobiography (Venter 2007), or else the production of an artificial microbial genome (Gibson 2008).
9. <http://www.ccc.de/congress/>.
10. www.genographic.nationalgeographic.com.

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