Bert Gordijn, Anthony M. Cutter (eds.), *In Pursuit of Nanoethics*, Springer, 2014, pp. 211, € 96.72, ISBN 9781402068164

Giovanni Osti, Università degli Studi di Padova – Centro di Ricerca CIGA

This book aims to contribute to the ongoing nanoethics debate, dealing with ethical issues arising from the complex and uncertain nanotechnology backdrop. In order to achieve this purpose, four topical areas are analysed. Each area refers to one of the four sections of the book and it is driven by an underlying question. What is effectively new in nanoethics? What are the specific opportunities and challenges of nanotechnology? What about risk and precaution? What about public engagement and policy?

After a first introductory chapter, the first section opens with a paper by J. Schummer. The Author addresses the political use and misuse of novelty claims surrounding nanotechnologies through an accurate conceptual clarification of *novelty* kinds, paradoxes and fallacies. Is nanotechnology novel? "Neither nanotechnology as a whole nor its individual research fields are new apart from the name" (p.24). Thus, "nanotechnology" can only be considered as an umbrella term that draws research budget by means of term/object and bandwagon fallacies. However, although the Author criticizes fallacious *novelty* interpretations, he recognizes that such nanoscale-based technologies generate specific situations as, for instance, notable research budget, attention to commercial usefulness, *nano-visions*. Hence the need to give prominence to public fear and hope, regulatory and international competition issues.

In §3, S. Holm accurately summarizes the main issues of nanoethics in four questions: "Do we need a new nanoethical theory? Are the ethical issues raised by nanotechnology unique? Can existing approaches handle all issues raised by nanotechnology? Do we need experts in the ethics of nanotechnology?" (p.32). Once having answered these questions, the Author states that nanoethics is a valid field of sub-specialisation and not a new sub-specialty of applied ethics. In other words, what we need are specialized nanoethicists, but not a new field of applied ethics.

These two opening papers are strategically located as they provide the reader with tools to address this volume (and the whole nanoethics debate) critically.
In §4, R. Sandler analyses what might be learned from the GM food experience for nanotechnology. The Author collects many similarities and dissimilarities comparing GM food and *nano* outlooks and then, thanks to this work, he offers three lessons on public engagement, technological fixes and case-by-case assessment. The last lesson is particularly remarkable as it suggests that a nanoethics overly generalized debate is not fruitful not only because it does not consider the specificity of nanodevices and related contexts, but also because it steers itself toward a strict and fruitless polarization between *nano*-supporters and *nano*-opponents.
The second section presents opportunities and challenges arising from nanotechnologies, in particular focusing on nanomedicine, body modification, biodiversity and nanotechnologically enhanced combat system.
M. Latham's paper is grounded in three unavoidable premises: cosmetic products using nanotechnology are already available on the market and they are growing steadily; famous cosmetics companies are investing significant research budget in nanotechnologies; there is still cognitive uncertainty about the effects of nanomaterials on humans' tissues. Consequently, the nanomaterials presence is already real in cosmetics and medicine realm. However, *nanomedicine* does not coincide with *cosmetic use* of nanotechnology, as the former involves intermediaries (doctors) who refer to their professional duties and not only to aesthetic criteria. Moreover, new possibilities of nanomedicine renew cultural feminist critiques against cosmetic surgery, critiques that are widely discussed in the previous pages by the Author.
In §6, the focus goes from nanomedicine and body modification to biodiversity, thus taking into account another classic topic of nanoethics debate, namely the environmental outcomes. This issue is crucial not only because environment is the backdrop in which we live, but also because a little change within it generates chain reactions that are not always predictable or manageable. In fact, nanotechnologies can also bring benefits, but some uncertainties still remain both due to nanodevices size, and because side effects are hardly wholly definable. Hence D. Macer suggests the need for ongoing research, more precise

labels when products include nanocomponents and policy choices driven by an *eco*-centric approach.
In the following chapter, R. Simpson and R. Sparrow explore how ongoing nanotechnology development in military field will redefine ethical issues arising from military conflict, namely how it would change *jus ad bellum* and *jus in bello*. The Authors take into account the couple IMP (Industrialised Military Power) and *underdogs*, where the former are states having resources to benefit from nanotechnology research, while the latter, by contrast, have relatively minor military capacities. Although "nanotechnology itself is not a weapon" (p.96), actual and future *nanotechnologically enhanced combat system* will increase asymmetry between IMP and underdogs, decreasing former's vulnerability level. Consequently, the latter, to increase their victory chances, must not only resort more to guerrilla, but also aim at targets remained vulnerable, i.e. civilians. Therefore, the ongoing pursuit of invulnerability to violence "would come with its own peculiar problems" (p.102).
The third part of this volume faces a huge (and still unresolved) issue involving emerging technologies and specifically nanotechnologies: what is the best way to deal with risk?
In the first chapter of part three, F. Allhoff begins his work with an in-depth analysis of the concept of "risk". According to the Author, it is possible to speak about risk only after a conceptual explanation of the term and its arrangement in an appropriate epistemological backdrop. After this preliminary work, Allhoff compares cost-benefit analysis and precautionary principles, claiming that they are not alternatives, but rather that "precaution *supplements* cost-benefit analysis *given uncertainty*" (p.127).
"Is the precautionary principle useful in nanomedicine?" is the core question of §9, involving two of the most discussed topics in the nanoethics debate, i.e. precautionary approach and medical use of nanotechnologies. In attempting to find an answer, at the beginning, R. Andorno and N. Biller-Andorno usefully and accurately display four moral issues that nanomedicine might raise (toxicity, increasing gap between diagnosis and therapy, privacy, enhancement), and in the central part of the chapter they reconstruct the principle history. After that the Authors can answer the key question. Precautionary principle should not be overestimated because it mainly is an appeal to caution and it is not a directory of fixed solutions.

Therefore, its role is "to provide some broad *guiding criteria* to policy makers", pending new outcomes of the ongoing research.
In §10 K. C. Elliott leads readers' attention "upstream", where nanotechnologies scientific research takes shape, in order to point out that normative points of view are significant also at this stage and not just "downstream", in the public-policy domain. "Non-epistemic" values play a decisive role at the beginning of *process*, that is when data to be sought are selected and categories to describe outcomes are chosen. Then, the Author analyses nanotoxicology research according to the considerations just mentioned. In conclusion, Elliott, through three proposals, suggests the need for a scientific training sensitive to ethical and social topics, in order to adequately and promptly face the challenges raised by the "upstream" stage to nanoethics.
The final section concerns public debate and policy, i.e. a discussion on the actors who manage nanotechnology *direction* and on the role citizenship can potentially play in this process.
In §11 P. Macnaghten makes an accurate review of the current literature on public perceptions in order not only to provide readers with a useful historical survey, but also to let underlying frameworks out. These frameworks may limit nanotechnology knowledge to public, addressing attention only to certain aspects (such as long-term benefits) or uncritically conveying value judgements and categories. After the review, the Author draws out three key points: there is a significant optimism for nanotechnologies; the nanotechnology promise to control nature at its core is a galvanising symbol whose effects should not be overlooked; lay public's desire should be more informed and involved.
From the very beginning, nanotechnology discourse has fed itself thanks to the future-oriented narratives it has raised immediately. In other words, nanotechnology impact plays a role not just in a *factual* dimension, but also on a *discursive* level. Who may access to this level? In §12 S. Arnaldi addresses the issue of accessing the production of future-oriented narratives and suggests that the public should be involved more, in order to (i) broaden "perspectives about alternative future developments and choices" (p.184), and (ii) go beyond the actual technocratic model.
In the final chapter, H. ten Have not only introduces and examines European public policies on nanotechnology, but he

also looks at the international context and the role UNESCO plays. The premises in this paper are clear: science and technology are a worldwide phenomenon and therefore it is necessary that international bodies coordinate each other promptly, allowing bioethics to accompany (and not follow) latest technological developments. For instance, "research consortia and pharmaceutical companies are transferring their activities to less developed countries where legal frameworks and public oversight are less extensive" (p.193). So, how to deal with these economic and bioethical issues? According to the Author, European Union and its reports play a key role on a global level as they try to restore trust in science and technology so that *nano*science and *nano*technology will be a help and not a hindrance in achieving the Millennium Development Goals.
This collection of essays offers a broad and complete contribution to the ongoing bioethics debate thanks to its four-part division. The first part plays a key preliminary role as it enables the reader to frame the following three sections. Indeed, examining *novelty*, identifying the main questions of nanoethics and comparing nanotechnology to GM food is a fruitful way to face the debate. Moreover, nanomedicine, body modification, biodiversity and *nanotechnologically enhanced combat system* are unavoidable topics with which a bioethicist must confront himself now and in future. Furthermore, dealing with risk perception, several precautionary principle formulations and public fears and expectations represents the arduous framework wherein policymakers and stakeholders should formulate appropriate responses.

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