'PARTICIPATION' AND CITIZEN SCIENCE IN NATURAL HISTORY MUSEUMS

A REPORT ON ETHNOGRAPHIC RESEARCH IN THE MUSEUM FÜR NATURKUNDE, BERLIN

Chiara Garbellotto, PhD Researcher
Supervisors: Prof. Dr. Tahani Nadim, Prof. Dr. Sharon Macdonald
11.01.2021 Berlin

CONTENT:

INTRODUCTION

Museums of natural history, especially those where scientific-academic research is undertaken as an integral part of the institution, are particularly relevant places to explore processes of co-construction of 'science' and 'the social'. There, museum practitioners and scientists inhabit both specialised and shared physical spaces and make use of the same organizational structures and infrastructures; indeed, the separation among scientists and museum practitioners itself is a fictional one, especially when it comes to public engagement. Concepts of 'mediation', 'interface', 'bridge' are often used to articulate the kind of work done through these practices, which broadly include the production of permanent and temporary exhibitions, interpretational material, educational activities for schools, guided tours, collaboration with external groups and communities, workshops, live talks, artistic programmes and citizen science (CS) projects. Public engagement practitioners nevertheless, can be themselves trained scientists and science researchers can engage directly in public engagement activities. This is especially valid in the case of the professional world of science communication, the usual framework for science and natural history museums. Moreover, this separation implies a further crucial distinction, that between 'museum people' and 'the visitors', in all the variety of declinations (i.e. 'the publics', 'museum users', 'citizens').

Understanding the role of museum workers in this field as mere translators or amplification of knowledge content produced by scientists for the publics – what the more rigid version of the *Wissenstransfer* (knowledge transfer) paradigm implies – does not permit to grasp how projects take shape and are carried out on the ground, foreclosing the possibility of thinking new forms of collaboration and workforce structures. Indeed, citizen science in science and natural history museums has come to a new revival in the last years especially because of its described power to open up the relation between such institutions and their publics to more collaborative and dialogic forms of doing the various scientific themes and practices. As I will briefly introduce in the next chapter, citizen science is being more and more implemented as a 'standard'

format that invites people to closer participation in the processes themselves of scientific knowledge production. As part of the broader and multifaceted problem field of 'museum participation', citizen science does follow a specific path within it, not lastly because it is directly mobilised in governmental research and innovation plans and institutionalised in international professional platforms, policy-making practices and funding programmes.

How museum people work alongside each other in the same institution, respond to different professional frameworks and protocols and participate to internal discussions is not univocal and highly depends on the organizational model and hierarchy of the institution. Scholarship on museum organizations, particularly those moving from an ethnographic and STS approach, have shown how experiences, positions and epistemologies coexist and unfold through multiple patterns in the messy realm of affect and communicational atmospheres as much as in practices of management and coordination (Macdonald 2002; Macdonald, Gerbich, and von Oswald 2018; Morse, Rex, and Richardson 2018; Meyer 2010; Rader and Cain 2014; Star and Griesemer 1989). Ultimately, what public engagement is emerges from both the production of guidelines in the attempt at creating institutional coherence and the performance of the different projects on the ground, according to their contingent assemblages of actors, methods and issues at stake (Harvey 2009; Michael 2012).

This understanding of public engagement grounds the present report, which covers part of the ethnography that I conducted during the years 2018 and 2019 for my doctoral research at the Berlin Museum of Natural History. Through the presentation of a case study, I will take into account a central theme for public engagement in this museum, namely the entanglement of biodiversity and participatory cultures. By using the plural term 'cultures' I refer to the multiplicity of meanings and practices produced and performed as part of different project assemblages, of which citizen science is one. 'Biodiversity' and 'participation' do not defer in fact in this report to fixed and univocal significations, starting points from which participatory formats are designed; they are

instead the final products of such formats and, it follows, always situated in the experience. Having said that, in the exploration of the different formats during my research I could recognise certain patterns specific to a mode of doing public engagement that emerged from both the performance of local professional repertoires and the crossing of dynamics concerning 'biodiversity' and 'participation'. These two concepts pertain to different realms not only because they have emerged as part of different knowledge cultures, at different moments and in different constellations of geographies, but also because they articulate actors and practices at different scales and extents. Nevertheless, museums of natural history are places where they both circulate and indeed become entangled in practices of public engagement.

The two dynamics I mostly take in consideration as part of my research are on one side, the datafication of nature brought about by the massive turn to computing technology and methods in the field of biodiversity studies (Asdal 2008; Bowker 2000; Devictor and Bensaude-Vincent 2016; Gabrys 2016; Jasanoff 2017; Nadim 2016; Waterton, Ellis, and Wynne 2013); on the other side, the challenge to a neo-liberal inclusionary discourse on participation as mere access to and representation in public (cultural) institutions moved by professionals and activists, who call instead for the decolonization not only of narratives and voices, but also of the institutional structures and organizational infrastructures through which resources are invested, workforce employed and knowledges produced (Bayer, Kazeem-Kaminski, and Sternfeld 2018; Das and Lowe 2018; Janes and Sandell 2019; Onciul 2015; Tuck and Yang 2012). In this report, I particularly write about the 'Citizen Science Project Nightingales' (*Forschungsfall Nachtigall*), a project produced by biologists at the MfN. In dialogue with the chosen literature, I question the linearity of the practices and the fixity of the concepts as they are represented in the museum's discourse. I attempt at doing so by tracing relations among actors and environments that are not visible in the given representation of such project (Winthereik and Verran 2012).

Box 1: Ethnographic research

As doctoral student in the 'Making Differences' project at the Centre for Anthropological Research on Museums and Heritage (CARMAH), I was funded by the Alexander von Humboldt Foundation as part of the research award for Sharon Macdonald's Alexander von Humboldt Professorship. CARMAH is based at the Institut für Europäische Ethnologie (IfEE), Humboldt Universität zu Berlin.

The doctoral project was conceived in the framework of the research area entitled 'Science and Citizenship' in collaboration with the Museum für Naturkunde Berlin. The ethnographic period began in January 2018 when I officially joined as Guest Scientist the museum's department 'Humanities of Nature' (HoN) and ended in July 2019. By participating to internal meetings and workshops of the Museum and Society Science Programme, I could learn about the structure and infrastructure of the museum – especially regarding policies and politics of 'participation' – and to take part in more informal moments of practitioners' daily life.

Langer Tag der StadtNatur 2018 – photos by Chiara Garbellotto

The qualitative research consisted of participant observation and observant participation in different kinds of public engagement formats, such as guided tours, workshops and night events and talks. With some of the practitioners from the Education and the Experimentierfeld teams, as well as with members of the Forschungsfall Nachtigall CS and the Naturblick App projects' teams, I could maintain a prolonged exchange. During the ethnography, I also had the chance to meet and ask questions to some of the collections' curators, some of the tour guides and the head of the Entomological Society ORION Berlin.

ORION Excursion, Krumme Lake Grünau, (01.05.2018) – Photos by Chiara Garbellotto

Finally, a significant part of my research consisted in co-designing a series of workshops with both MfN practitioners and external researchers and artists (see Box 2).

THEORETICAL TOOLKIT

The ethnographic research that this report draws upon is situated across multiple fields of scholarship, articulating together questions that have been and are addressed through different methodologies and as part of different debates. The area of studies where it is situated is that of material semiotics, a 'set of approaches' (Law 2019) that includes STS, anthropology, more-than-human geography and feminist studies. As already introduced, this report will focus specifically on how 'participation' was both mobilised and performed within the Museum für Naturkunde in specific connection to a CS mode of doing 'biodiversity'. Positioning my research alongside feminist sensibility, this object theme has been also informed by other concerns such as the persistence of scientific scopic epistemology and heteronormative discourses, the role of accountability towards politics and historicity of scientific production, and the response-ability to think and do alternative more-than-human relations.

Two recent directions that scholarship has taken in critically addressing natural history museums have also contributed to the unfolding of the research: on one hand, the questioning of disciplinary boundaries that the debate on the Anthropocene (Capitalocene/Chthulucene/Plantationocene etc.) has opened (Cameron 2018; Harrison 2015; L'Internationale online 2016; Kiefer 2020); on the other, the acknowledgement of the interrelatedness of cultural and biological heritage, especially as a consequence of the challenge that indigenous' practices and knowledges move towards Western science and especially to museums collecting and archiving practices. In particular, the recognition that such communities have been dealing with the ecological crisis and the ecocides produced by capitalism for many decades before the 'coming' of the Anthropocene disrupts a de-politicised and techno-fix-oriented mode of dealing with themes such as species extinction at the centre of the CS project case (Agrawal 2002; Dhillon 2020; Escobar 1998, 2016, 2018; Grosfoguel 2011).

'PARTICIPATION'

The concept of 'participation' is here addressed not so much in terms of museum strategies of audience development or outreach building – how much 'participation' – but more in terms of when and where the term itself is mobilised and to what effect. Within the research period, such term appeared as part of the MfN institutional working framework of *Wissenstransfer* (knowledge transfer) and, at the same time, as part of how new public engagement projects were discussed and presented. By researching some of these projects in my ethnography, it was possible to acknowledge what STS scholars identify as a coordinating and ordering function of institutional structures, in the attempt of holding together a multiplicity of formats with their different aims, technologies, actors and modes of performing 'participation' (Law and Mol 2002); the complexity of the relations among the projects in the everyday working life is simplified for instance through museum practices such as the production of institutional identities and missions. The insistence on 'integration' among different departments and sub-departments as a central characteristic of the MfN organization resonates with the aim of finding an institutional 'consensus' on what 'participation' should be.

The coexistence of different modes of doing what is univocally referred to as 'participation' became indeed a central matter in my research. The mobilization of specific theories about such term and the performativity of internal meeting and produced documents on this topic were thus taken into account during the research as belonging to the mode of doing 'participation' at the level of the MfN managerial and organizational level. The observant participation during such institutional practices was nevertheless not kept separated from the participant observation conducted during the public engagement events themselves. The coming together of actors during such events and the unfolding interactions have been explored not by defining 'participation' not as a delimited territory of analysis – to which specific methods of analysis need to be applied, such as more or less quantitative evaluation and assessments. Instead, by

considering the multiple practices and events I took part to (broadly definable as museum public engagement) as a continuous realm of interactions, I attempted at resisting the risk of compartmentalising such practices and managing out the complexity and messiness of the experiences. To expand an understanding of participatory practices as either deliberative because purely dialogic or centred on an economization of power-relations, I explore the encounters and interactions trying to unbalance the attention from human-centred analysis to an understanding of participation as *assemblage* (Stage and Ingerslev 2016). As I will define further in the text, this concept allows me to take in consideration other actors such as the technologies used, the materiality of museum objects or animals themselves – as I will explain in the dedicated section, the attention to more-than-human relations is inspired by the *natureculture* approach I use. In doing so, I move thus from research on museums inspired by ANT (Knudsen 2016) and STS sensibilities particularly working on civic engagement with issues about environments, science and technology (Chilvers and Kearnes 2016; Chilvers, Pallett, and Hargreaves 2018; Lezaun, Marres, and Tironi 2016; Mahony and Stephansen 2016; Marres 2012; Thorpe 2010; Thorpe and Gregory 2010). Decentering 'participation' from human-centric subjectivities and exploring the material technologies and the dynamics of the professional fields invoking it, this literature can also be productively interweaved with the more recent discussions instigated by practice and research dealing with the ethics of collaboration in museums beyond natural history ones (Byrne et al. 2018; Landkammer 2016; Kamel 2016; Lynch 2011; Morse and Munro 2018; Mörsch, Sachs, and Sieber 2016; Morse 2018; Rito and Balaskas 2021).

Box 2: oddkin°labs

The series of workshops entitled 'oddkin°labs' is a collaborative experiment in between research and museum public engagement that I co-designed and co-produced together with independent researcher Sina Ribak and in collaboration with artists Constanza Mendoza and Sybille Neumeyer and visual anthropologist Nnenna Onuoha. The production was supported by CARMAH and by the MfN as part of its project 'Experimental Field for Participation and Open Science', led by Wiebke Rössig since spring 2018. Together with sixteen practitioners and researchers from the museum and fifteen from external working fields, we questioned in three sessions (June-July 2019) museum's objects and concepts and started an exploration of transdisciplinarity.

The choice of the themes developed through the discussions with Sina Ribak and it responded to the aim of combining the informal and dialogic form of a reading club with a direct engagement in artistic and open-ended research practices. The choice of the three collaborators was made because of their on-going work directly relating to practices and narratives of natural history museums.

Worlding environments, lab 0.0
Photo by Harriet Merrow

Visual note taking in the galleries, lab 0.1
Photo by Harriet Merrow

In three sessions we played a speculative card-game about environmental crisis and species co-adaptation; we created short audiovisual stories and explored the relation between cinematic and taxidermy practices and their modes of selecting what to preserve and communicate; we experimented with multiperspectivity and 'stratigraphic' storytelling, a polyphonic approach to the possibilities of narrating with rocks and stones.

With 'oddkin°labs' we proposed an approach to public engagement as research-oriented. Their production set up in fact an exploration of encounters between people working across museums, the academic world and more independent spaces of cultural production.

As part of the postproduction work, feedback meetings were conducted with the participants. To re-articulate such feedbacks into a form of 'active' documentation, we developed three posters/zines. Presenting fragments and impressions instead of outcome and findings, we aimed at diffracting further the critical discussions emerged from the workshops. A public presentation was hosted at Zabriskie Bookshop, Berlin (Dec. 2019)

'Storied matter' landscape, lab 0.2
Photo by Deborah Cohen

Presentation at Zabriskie Bookshop
Photo by Sina Ribak

'Citizen Science'

The concept and practices identified as 'citizen science' (CS) are currently under great inquiry in disciplines such as sociology of technology and science, political sciences and environmental politics, covering both institutional and autonomous projects. On one hand, this current 'participatory turn' in the production of knowledge, especially considering the field of natural history and biodiversity studies addressed in this report, can be seen as a follow up of that occurred in the 80s and 90s in Europe, when participatory action research (PAR), participatory rural appraisal (PRA) and participatory decision processes on environmental issues started being researched and experimented

with. On the other hand, this new wave of CS has a specific historicity in Germany, being connected firstly to the politicised movement of amateur naturalists and the related professionalization of fields such as ornithology and biogeography at the end of the XXIX century and secondly, to the development of environmental movements in the 60s and 70s. If these traditions point already to the existence of different kinds of CS, emerging from different groups and concerns about the application of scientific knowledges, the CS practices that are today at the centre of interest have all in common a solid base in the so-called digital revolution, which has been defining the exponential expansion of both data-driven biodiversity studies and communication technology.

> "(…) the growth of *miniaturised computational power*, which prompts big data approaches (especially in natural history) and the *rise of the web 2.0,* which made new technologies and social modes of participation in the co-production of knowledge possible, are the main drivers of digital participation." (Mahr and Dickel 2019, 2)

This quote taken from a recent article that examines how autonomous CS projects position themselves towards institutional scientific knowledge production – through a comparison with the historical case of the *Deutsche Ornithologische Gesellschaft* (German Ornithological Society) at the end of the XXIX century – is particularly relevant for the ethnographic case presented in this report, which was designed around digital sensing practices and on gathering and analysis of data. Further in the text, the authors point out nevertheless that 'public participation in research does not depend strictly on web 2.0 infrastructures'. Focusing specifically on the autonomous CS projects, they propose that the core elements that make them possible are 'An interdependency of social and scientific values, infrastructures for peer-networking, and a shared vision of the research object' on one hand and 'plenty of leisure time and a system of values that calls on the individual to use his or her spare time to do something meaningful (beyond satisfying individual needs)' on the other (2019, 12). This article is a good example of how an essential separation between experts and lay-people and between scientific institutions and independent civic groups is challenged by the STS approach on this

object of study. Such separation is indeed deemed as responsible for the risk on the side of scientific institutions to wipe out the participatory potential of developing relations and engagement with other civic groups and so-called 'stakeholders'.

> 'Based on the assumption of a gap of expertise "between scientists and ordinary people", crowd science projects may tend to reframe the problem of participation as a problem of "information transfer" (Lukyanenko et al. 2011: 465) and make the input of user as easy as possible. Hence, the processing of information and its transformation to scientific output becomes not only a black box but also a hermetic sphere in which the voices of the data collecting volunteers are rarely heard.' (2019, 15)

The accent put on crowd-sourced projects resonates well with the discussion I propose in this report since the institutional case taken here into account works also, but not only, with this kind of CS. It is indeed important to underline the centrality of the Museum of Natural History both as initiator of such project, as it will be described later in the report, and as active force in the German and European policy-making network of institutions working on research and innovation through CS. The centrality of CS in current governmental plans reflects the promotion and funding of a massive institutionalization and centralization of this new professional field. It is possible indeed to acknowledge a pursuit for the formalization and standardization of procedures and impact indicators as well as of formats and styles of its representation.

The diverse epistemologies, production means, affiliations, scales and politics of participatory projects that mobilise 'science' in relation to 'citizenship' challenges nevertheless the existence of such a univocal idea of 'citizen science' and draws attention instead to the very efforts put in the formulation of and the negotiation on definitions and procedural guidelines. This multiplicity is reflected also in the many analytical lenses that have been applied to research on CS and the variety of debates concerning its role in the shaping of contemporary and future relations between 'science' and 'society': among others, the historicity of the division between 'experts' and 'amateurs' connected to the negotiations on 'data quality'; the questioning of representational power, authorship and profit distribution in the production of

knowledge; the politics of the discourses about 'opening' scientific processes to non-scientists and enhancing people's 'scientific literacy'; the contestation of deliberative conception of democratic participation in terms of search for consent through rational debate with that of radical democracy as engagement with conflict and pluralism, in which CS is interpreted as knowledge making with an acceptation of activism and resistance (Bäckstrand 2004; Elam and Bertilsson 2003; Ellis and Waterton 2004; Kimura and Kinchy 2016; Lave 2012; Mahr and Dickel 2019; Jasanoff 2004; Ottinger 2015). Complexifying the relationalities and interdependencies between the actors involved and the material-semiotic modes of knowing and mobilising knowledges to different purposes, the theoretical approach I move from warns about reproducing conflicting and essentialising representations of the dynamics between the actors involved. At the same time, it pays attention exactly to closure dynamics that institutional scientific bodies tend to reproduce when in charge of CS projects because of the epistemological monopoly they can play out in their implementation and representation. Inviting citizens to participate in scientific research practices, it is argued, does not entail necessarily complete compliance and smooth integration of people's contribution to the scientific and CS professional epistemologies. Even when participants are not explicitly invested with political aims of producing alternative knowledges or developing counter-practices where scientific knowledge is used to validate social justice campaigns and actions, CS projects always carry the potentiality of making visible the non-uniqueness of scientific epistemology and the more ambiguous and incalculable aspects of how it is done.

'KNOWLEDGE'

Considering the prominent role of the concept of 'knowledge' in discourses on 'participation', especially when dealing with citizen science in natural history museums, it is important to clarify here also how this term is used in this report. The researched participatory practices have been designed with the assumption, at times explicitly voiced, that to 'care for nature' humans need to 'know nature'. The relation between

these two verbs – *knowing* and *caring* – and the multiple meanings they assume according to the practices within which they are used became indeed crucial in the exploration of my research field. Moving from an anthropological approach, the existence of a defined and stable definition of 'knowledge' is challenged by shifting the accent from the nominative form to the process of knowing. This shift allows considering the involved actors in their relatedness, avoiding an essentialist separation between the subject knower from the object known. Knowing is thus an on-going process where temporary positions are indeed taken through performative acts, but never in a definitive way. In this regard, it is a situated, relational and material-semiotic process. It is situated in so far it cannot be abstracted from the place where it is enacted. Donna Haraway's grounding articulation of situatedness (Hartigan 2015) describes the positionality and partiality of multiple knowledges as the very reasons for the need of critically understanding of how the differences among such knowledges are done. Knowing is relational because, beyond mere informational content, it refers to ordering practices that trace associations and connections among meanings and concepts. Given the existence of different ecologies of practices (Stengers 2005), 'knowledge' is thus plural and always intended as produced by certain 'knowledge cultures'. Finally, knowing is a material-semiotic dynamic (Haraway 2018; Law 2009): meanings and languages are not separated from the technologies, objects, spaces or artefacts that the practices work with. In the same way, knowing is not equivalent to a purely cognitive process. Affect and embodied experience are two crucial concepts to think of this process and the mediation of what is defined as 'knowledge' in other terms.

'Biodiversity'

As with 'knowledge', thinking 'biodiversity' with a material semiotics approach implies that also this term is addressed as something not fixed and univocal, but rather the product of different practices (Bogusz 2018; Takacs 1996; Turnhout and Boonman-Berson 2011). Thinking with ontological politics (Gad, Jensen, and Winthereik 2015; Law

2009; Law 2009; Law and Singleton 2014; Law and Lien 2012; Mol 2002) 'biodiversity' becomes plural as well – *biodiversities* – as different actors 'do' this concept differently, employing different technologies and with different aims. If this is the starting point, *biodiversities* done by scientific practices multiply even further as part of museum public engagement and science communication. Moving from history and sociology of science, 'biodiversity' is moreover considered in this report as a critical knot in the relational production of what 'nature' and 'the social' are. This is particularly connected to the understanding of the role that public engagement practices – projects, practitioners, technologies and representations – have in the specific dynamics of this museum organization. The recurrent self-representation of the MfN as an actor in between 'science' and 'society' is grounded on its central focus on biodiversity both in research orientation and science policy work. As it will be presented in the ethnographic case, this is directly entangled with the expanding field of institutional citizen science, which finds at the MfN a central platform not only for the German-speaking countries but also at the broader European and international scales.

ASSEMBLAGE

Moving from these theoretical approaches, the analytical concept of *assemblage* (DeLanda 2016) was particularly generative to articulate multiple practices of public engagement within a highly hierarchical and structured museum such as the MfN. This term allows me to explore the researched projects as more-than-human assemblies that are temporary. On one side they are designed in response to certain professional discourses and practice traditions but, at the same time, they become unfold in unpredictable ways at the moment they are enacted by the actors involved – humans, animals, specimen, artefacts, technologies, architectures. As Couze Venn describes, *assemblage* 'recognizes both structurizing and indeterminate effects: that is, both flow and turbulence, produced in the interaction of open systems.' (Couze 2006) Such term is thus useful to conceptualise the network of practices and actors involved in the production of different projects offered by the MfN beyond the confined

choreographies of the 'public event'. The emergent and open-ended qualities of *assemblages* particularly fit my intention to challenge a managerial approach to this museum field, which account for what happens as part of these projects by applying evaluative technologies to such events, with the related proliferation of actors profiling and processes standardization. The gap between the emergent and affective events that the ethnographic method can make visible and the stabilising representation produced for museum accountability procedures is where my research attends at the politics and ethics of public engagement. The use of *assemblage* ultimately permits to challenge the *Wissenstransfer* approach and the idea of knowledge as cognitive content to debate upon, which leaves the question of 'how to care together for' unaddressed (Stage and Ingerslev 2016; Waterton and Dittmer 2014).

NATURECULTURE

To explore public engagement practices working with biodiversity and natural history more broadly, this report argues for the necessity of a specific theoretical stance, namely the one provided by the concept of *natureculture*. The scholarly work on such concept, moving from the seminal works of Marylin Strathern (1980) and Donna Haraway (1997), is, I argue, the most generative environment to think about what kinds of relations among actors emerge in the researched assemblages. The separation between natural and cultural realms warrants the detachment of scientific methods and claims of objectivity from those attributed to subjective 'culture'. By showing how scientists, technologies, animals, etc. are instead already 'more-than-human' in the way they relate to each other in the everyday constellations of scientific practices, this approach encourages attending especially to the affective in such relations, otherwise than considering them purely as rational cognitive exchanges (Latimer and Miele 2013; Thrift 2008). Considering how biodiversity sciences build upon the natural sciences endeavour of naming, measuring and valuing 'non-human life', attending to the relational *inbetweeness* of how categories and differences are produced not only by scientific projects themselves but, most importantly to this research, by museum

mediating practices implies to make visible also how such mediation risks to reproduce of the nature/culture divide. Including non-humans in the production of knowledge is indeed the most relevant methodological shift afforded by this approach. A *natureculture* approach resonates greatly with the kinds of relations unfolding among humans and non-humans in natural history museums because, besides technologies and artefacts, the non-humans at issue are also 'bio-worlds' (Puig de la Bellacasa 2010, 159), both dead and alive. These kinds of relationalities become particularly visible through the aforementioned attention to the affective realm. *Natureculture* nevertheless does not only serve a different kind of analytical work. Being rooted in feminist thinking, it refers to ethic and political modes of living, opening research practice to experimentation with *how* public engagement could and should be done. It is in this sense that this report envisions public engagement itself. Neither a mere amplification of the scientific knowledge produced in the museum nor a 'neutral' mediation through debates on such knowledge, participatory public engagement is instead thought as a collaborative experiment in the exploration of how more-than-human relations could and should be taken care of.

CARE

Throughout the undertaken ethnographic research, a conception of scientific knowledge as matter of fact and matter of concern (Latour 2005) grounded a double articulation of 'participation': a cognitive debate based on the objectivity and truthfulness of concepts and information discussed and, in its most 'open' version, a contribution *to* the production of such knowledge. Moving from the work of Maria Puig de la Bellacasa, I turn to the concept of *care* as a feminist tool to imagine museum work on publics' engagement in natural history museums as also a space where current scientific practices and debates are critically engaged and the historicity and politics of knowledge production explored. In the article already referred to, the scholar regards the 'obligation to care' as a 'necessary constraint.' (2010, 162–63). Taking this formulation from philosopher Isabelle Stengers, she discusses *care* in relation to

natureculture in the feminist tradition in terms of ethic-political everyday practices. Stressing the interdependency between individual and private forms of care and the social and public ones, the author particularly clarifies how a *natureculture* ethics of care is always done in situated contingencies and relationalities and never determined by a normative moral. Thinking specifically about biodiversity and the related environmental concerns, *natureculture* shifts both a utilitarian and altruistic attitude towards non-humans to one acknowledging the mutuality of *care*. This shift works not only when considering existing situations of human and non-humans co-dependency in specific environments – i.e. the relation among Berlin citizens and nightingales as the case example here – but also when considering the museum itself as an environment where more-than-human co-dependency situations (*assemblages*) do exist and unfold (Light and Akama 2014) (Nuala Morse and Munro 2018); (Puig De La Bellacasa 2017).

ETHNOGRAPHIC CASE: DATA, STORIES AND PLACE

From February 2018 until May 2019, my ethnographic research unfolded largely in relation to the Citizen Science Project Nightingale (*Forschungsfall Nachtigall*), a two-year project designed and produced by a team of biologists based at the Digital World and Information Science department of the MfN. Scientifically aimed at investigating nightingales' diverse songs repertoires and mapping their distribution in Berlin, this CS project had the intent to engage people in the scientific processes of knowledge production belonging to this field, beyond single events and the transmission of informational content. Even though the broader logistics of this case is not the scope of this report, it is relevant to underline how much this project was embedded in the recent booming of the CS field within German-speaking countries and Europe. Both the platform for citizen science in Germany *Bürger Schaffen Wissen* (Citizen Create Knowledge) and the European Citizen Science Association (ECSA) are based indeed at the MfN. An example of this is the 2016 funding from the German Federal Ministry of Research of thirteen CS projects with almost 5 million euros over three years, among which the Nightingale Citizen Science Project.

Designed as a 'modular' programme for defined 'target groups' – school children, young people from the club scene and Berlin 'new citizens' – the project was based on the scholarship produced as apart of an already existing network of biologists working on this species across multiple Berlin-based institutions, such as the Free University of Berlin and the Leibniz Institute for Zoo and Wildlife Research. The scientific interest for the nightingale species reflects the long-term research conducted in Berlin in the field of animal behaviour, ecology and bioacoustics. The analysis of the distribution of the nightingales' population in connection to the research on song learning and dialects' differentiation was at the centre of the scientific aim of the project, which requires a high number of digital, geo-localised recordings of singing male nightingales during the breeding season (European zone: mid-April – beginning of July). In collaboration with developers working for the MfN team that produced the recognition App 'Naturblick', a

new section dedicated to the project was thus added. The role of nightingales as charismatic species becomes particularly relevant to this project in order to address the issue of extinction in connection to the climate crisis and the anthropogenic-caused habitat change in cities and rural areas (i.e. use of pesticides in agriculture; tide up of scrub zones; construction development). Their striving presence in shrubs and trees of many different areas of Berlin offers a rare example of 'habitat quality', particularly connected in this case to the historicity of the urban development and maintenance of the German capital's 'green'.

As a consequence of the project launch, a complex assemblage of actors has convened along 2018 and 2019, composed not only by humans and nightingales. Mobiles and apps, computers and software, educational cards and slides, sewing material, CS guidelines and web platforms, city parks, social media, maps and photographs were some of the most visible ones within the relational field thanks to the team mediation work and indeed to my research ethnographic approach. I became indeed a part of such assemblage, although in a peripheral way, by firstly entering in conversation with its project leader Silke Voigt-Heucke and then by participating in some of the internal and public events and workshops dedicated to adult publics, by analysing governmental and scientific papers, by co-writing an article with my doctoral supervisor Prof Tahani Nadim and by collaborating in the creation of an accompanying video 'trailer' directed and produced by visual anthropologist Debbie Onuoha. Due to organisational reasons, I was not able to have a more direct exchange with some of the participants who joined the project more intensively. This and other contingent developments influenced the direction of the theoretical work and were anyway considered meaningful events in the ethnographic process.

In my research, I chose to engage with participation and biodiversity cultures and their practices by attending particularly to two of the CS formats: guided tours and events for the 'community'. These were offered as part of two out of three main strands of the project, namely people's engagement in the digital recording and bioacoustics analysis

of nightingales and the collection of personal stories and literary works dealing with these birds from people joining other events and channels.[1] Applying a *natureculture* sensibility in the exploration of these moments is a way to question the tendency to represent them as belonging to separated and compartmentalised realms of more-than-human engagement. Biological knowledge and practices on one side and a cultural-artistic approach on the other appeared to be treated as distinct undertakings in the communication strategy and in the ways the data were produced, collected and used. It is interesting to reflect on this especially because, quite unusually for CS projects dealing with natural history content themes, science, arts and culture have been brought together and mobilised an essential part of the project. It is though the juxtaposition of different practices and expertises – recognisable also in the internal symposium organised by the team, where the three sessions' titles were 'Nightingale and Culture', 'Nightingale Science' and 'Nightingale Conservation and Education' – that I want to question by trying and making visible instead the undisciplined modes of co-inhabiting the project environment. The separation of the two modes of knowing, I argue, works to reproduce on one hand the material conditions necessary to maintain both scientific knowledge production, such as peer-reviewed publications and contributions to scientific and CS networks logistical functioning; on the other hand, the separation leaves all the disciplines' involved both unquestioned in their essentialistic representation.

STORYING PLACE

Choosing to work with a *natureculture* approach primarily entails the methodological move of considering the CS project as a multispecies assemblage and the birds as active contributors to its unfolding, as well as humans and technologies (Bird Rose and Dooren, 2012; Gibson et al., 2015; Hinchliffe, 2017; Pizarro and Larson, 2017; Somerville and Bodkin, 2016). By listening, walking, telling, remembering *alongside*

---

[1] The third strand was designed for primary school children to raise awareness and literacy about the nightingale species and local biodiversity and promote a direct experience of 'nature'.

nightingales, as Johanna Latimer proposes in her critical response to Haraway's 'thinking-with' (2013), a particular kind of critical reflection is opened up about 'modes of knowing' and 'participation', one that, besides representational accounts of CS project's indicators (Anderson and Harrison 2016), calls into consideration the affects and the embodied experiences through which the everyday life of such project unfolded. By engaging more closely with the lives of nightingales and indeed by physically going closer to them in order to perform and mediate animal behaviour and bioacoustics research, issues such as environmental relations as memory and politics of urban governmentality were also mattered in the multispecies encounters through both detachments from and attachments to the animals (Despret 2013; Latimer 2013).

To meet the purpose of this report, I want to propose a possible way to work with ethnographic observations and *naturecultures* by working here with the concept of 'sense-of-place' or better, by asking how a 'sense-of-place' was made in the researched encounters. This concept can be generative for this case in so far as the project's scope has been designed by the team in connection to a conception of nature as 'out there' in contrast to private places such as the museum itself and private homes. At the same time, it defined the city of Berlin as both capital of the nightingales and a common place of arrival for the 'new citizens'. The separation of the 'private' from the 'public' indeed permeates at many levels the project, hinging so crucially on the museum institutional function of engagement of 'publics' within the modern space of 'public life'. The 'out there' and 'Berlin', nevertheless, are considered here not as pre-existing categories but as produced through the project's enactment, whose aims and strategies directly informed its material production. Encountering nightingales in their habitat was in fact the solution that biologists proposed in response to their concerns regarding public awareness about extinction in 'urban nature' as a consequence of anthropogenic-induced changes. Such solution also responds to other specific necessities of the institutional location where these concerns live: broadening museum audiences, making use of the Naturblick App developed by a different museum's team, adding records to the museum *Tierstimmenarchiv* (Animal Sounds Archive) and making the raw

files available in the spirit of 'open science'. Issues of intensive agricultural use of rural land and urban management of parks and Berlin *Brachen* have been indeed addressed and voiced in both private conversations and during guided tours exchanges, but never as working material for the participatory activities themselves. This was possible, I argue, thanks to a separation between the outputs produced on one side – the bioacoustics analysis and its visualizations in the strophes catalogue and the map or the inscribed stories and memories – and the sphere of embodied and affective experience on the other. This is particularly relevant when considering the aim of guided tours and 'scientific' workshops to form a sort of training in bioacoustics and animal behaviour for the participants. This took the form of oral explanations, visual prompts (i.e. plasticized A4 boards and PowerPoint's presentations) and invitations to join the recording practice. This training mediated the encounter experience through a specific language and certain technologies, which articulated nightingales into selected descriptions of those actions and interactions that matched scientific questions and methods.

Deborah Bird Rose and Thom van Dooren's definition of place is an interesting angle from which to think such human-nightingales encounters differently:

> 'Places are materialized as historical and meaningful, and no place is produced by a singular vision of how it is or might be. In short, places are co-constituted in processes of overlapping and entangled "storying" in which different participants may have very different ideas about where we have come from and where we are going.' (2012, 2)

Considering the authors' intention of reconstituting cities as places for multispecies conviviality (Hinchliffe and Whatmore 2006), further in the same text they make their ethical proposal explicit:

Fig. 1 - Berlin scrubs, Park am Nordbahnhof, Berlin - Photo by Chiara Garbellotto

"(…) the place of wildlife in the city opens our engagement with the urban in ethically compelling ways. The city is not so much an objective fact as it is a specific material mode of storying — a way of understanding relating and becoming. It is a story, told and enacted by many creatures. And ultimately, this intersection of multiple storied-places and their tellers gives rise to an ethical question of particular importance for this time of anthropogenic change called the "Anthropocene": are we able to engage meaningfully with very different ways of knowing and living in a place?" (2012, 18)

Apart from human-centred storying positioning animals and environments as symbolic prompts for identity-making processes (Haywood 2014; Pizarro and Larson 2017), this approach invites CS practitioners to pay attention to the possibilities opened up by exploring how animals and humans produce their place by being 'alongside' each other. Interestingly, in this case, the capacity to produce a meaningful relation to the local place can be recognised as a central object of the project's scientific endeavour itself, namely, the exploration of nightingales' repertoire transmission during breeding and the hypothetical differentiation of dialects according to specific geographical areas. The capacity of nightingales to construct meanings according to their perceptive and

communicational capacities is particularly related to their complex and open-ended learning process that begins when songs are transmitted to the next generations during the breeding season and influenced by the acoustic environments where they sing and nest. It also manifests in the 'site fidelity' of these birds that, in the seasonality of their migratory pattern, go back to the same breeding *Revieres* (territories), even to the same tree branch. These characteristics, combined with the fact that nightingales have been less affected by urban developments in Berlin than in other European cities – the cities comparisons exists precisely because of the history of ornithological monitoring that does provide data to compare – make nightingales the perfect actor to work with in a CS format and to use as a proxy to engage people in naturalist practices 'in situ'.

Field notes

The first movements of this new sensing organism made of people, phones, glasses, walking sticks, and torches unfold along the southern side of the park: The guide keeps us on the external sidewalk and conduces us towards the first point where she knows that a nightingale had picked his stage. After having taken out of her backpack a number of laminated A4 sheets, she recounts a list of information concerning the species "Luscinia megarhynchos". Holding them in her hands towards us, she leafs them all through, sometimes pointing at specific details and sometimes handing them out to us. I see words, a visual representation of one male nightingale, a picture of tiny new-borns in one nest, graphics, numbers, maps.

Guided tour in Volkspark Friedrichshein, Berlin (01.05.2018)

As previously mentioned, human stories about nightingales had a particular place in the project, being the focus of the 'cultural' and 'artistic' series of events. A series of informal meetings was organised during the two years together, as well as opening and closing formal events, alongside the 'scientific workshops' in order to develop the collaboration among the team and those participants who wished to be more regularly involved in the project. In some of these meetings, the interest in the 'cultural' aspect of human-nightingale relations was structured around the collection of personal memories and literary productions about these birds. This activity materialised on a

tablecloth where some of the members of this newly formed 'community', together with one of the project's leaders, sewed a stylised map of Berlin and stories, in the form of written notes and images, were stitched around the map. As the team member responsible for this activity more recently told me, the process of collecting such stories was not as successful as expected, since the participants who had been explicitly invited for this activity, those defined as 'new Berliners' or 'new citizens', shared fewer stories than expected and thus other participants were also included in this collection process. Nevertheless, the tablecloth worked as a catalyst to come together at the museum and relate to the nightingales in ways other than through scientific research. Further examples of modes of relating to the birds through artistic production have been the photographic project on nightingales' *Revieres* produced by an artist or the collaboration with a musician who had been improvising jam sessions with birds for many years. Still further examples include the input from a woman who had been working through craft with textiles to sew bird puppets or the many video contributions

---

Box 5: Field notes

Seated close to the same couple of participants, I listen to the others who are presenting themselves and to the Power Point presentation. This time, it focuses mainly on the software Avisoft-SASLab Pro and on trills ('Pfeifstrophen'), the songs' elements that last time were chosen as "good" data to look at today – good entailing mainly their visibility as black on white marks on visual media. The scientists have pre-selected, cut, cleaned, and uploaded within 4 laptops a long series of them so that through Avisoft, they tell us, we are able to visualize frequency (y axis), time (x axis), and amplitude (colour intensity), the three variables that allow us to "read" those sounds. Dividing into four groups of roughly four people each, we are brought by the scientists' voices into the world of cataloguing. Dragging the files into one specific area of the software interface, which transforms them into spectrograms, identifying the beginning and the end of the trills on the black marks of the spectrograms and cutting the trill are the first steps. This is followed by the calculation of the three variables specific to that trill by clicking on specific icons and the display of information concerning the record's metadata by clicking on another icon. In our group this last steps creates some issues concerning which icons to click on and in what sequence, and tabs keep popping up hiding other tabs and open folders.

'Workshop Zur Bioakustischen Analyse der Nachtigall-Gesänge', MfN (06.11.2018)

that other participants posted on the project's Facebook page. These artefacts and the related processes of meaning-making speak to multiple interactions that human and nightingales can generate, according to different capacities, sensibilities and contingencies. What I find particularly relevant to my research is how the interest for stories assumed a particular form and visibility as they were materially done in the project. On one side, taking into consideration the correspondence existing between the practice of songs geo-localization on the digital Berlin map and that of stories collections and correlation to a specific position in the Berlin textile map impels a problematization of how this mode of visualising the relation to space was valued. If strophes were extrapolated from the song recordings to analyse comparatively the repertoires and to explore hypotheses about learning and communication in multiple urban areas, stories were mobilised as compounded information, accumulated one beside the other and also mediated through the specific indexical technology of the map, re-coding participants' memories into the same aerial and abstracted territorialisation of Berlin. These different kinds of data were thus extrapolated from the singing and story-telling events, becoming manageable and visible precipitates of the complex and contingent experiences from which they emerged.
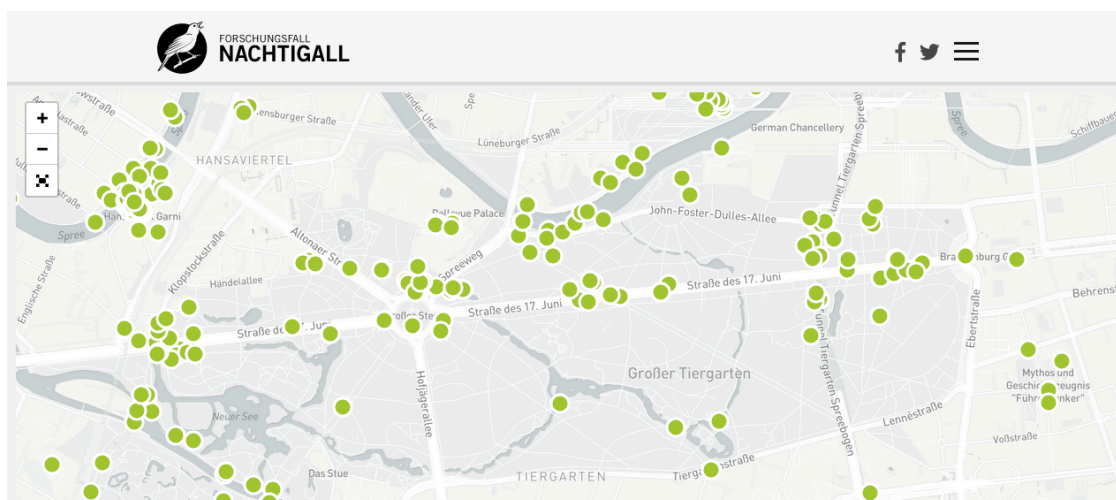

Fig. 2 - Tiergarten on the FFN map - forschungsfallnachtigall.de/karte (accessed 23.12.2020)

RE-SOUNDING PLACE?

Going back to the ethnographic experience through the concept of 'sense-of-place' is one possible way to articulate how affective modes of engaging with these birds and their environments contributed to the creation of the humans-nightingales assemblage. If we take the definition of story given by Deborah Bird Rose and Tom van Dooren as "(…) that which emerges out of an ability to engage with happenings in the world as sequential and meaningful events" (Bird Rose and Dooren 2012, 3), we can find meaningful expressions of different kinds of relationalities with the nightingales for instance in the wish of participants to have the recorded songs given back to them after having uploaded them in the App. This wish for communicating the closeness to birds is also evident in the choice of a participant to wear a T-shirt with a printed bird on it during the bioacoustics workshop. The curiosity manifested by participants during one guided tour to discover more about other birdly places – a wooden birdhouse nailed on a tree and the entrances of the pedestrian underground tunnel beneath the *Siegessäule* (victory column at the centre of the main roundabout at the centre of the capital's *Tiergarten*) where swallows nest can also be recognised as a mode of making that experience meaningful by engaging with the locality of the experience. The atmosphere of suspense when getting closer and closer to the singing nightingale in the night parks and the voiced emotions shared by everyone in the group when seeing one manifests finally the role of affect in the collective performance of such encounters.

As already mentioned, the on-going scientific research grounding this CS project works specifically on nightingales' long-term learning and use of song types. The difference between young and older nightingales in the plasticity of songs sequencing is studied through the analysis of singing interactions such as song matching, song overlapping and the temporal response patterns. (Bartsch et al. 2014; Bartsch et al. 2016; Bartsch, Weiss, and Kipper 2015; Kiefer et al. 2014; Kiefer et al. 2014b; Sprau et al. 2013; Sung and Park 2005; Weiss, Kiefer, and Kipper 2012; Weiss et al. 2014). One example from this specialised research is the study of how new songs are added to the male

repetoires[2]. The (small) percentage of 'unshared song types' existing in the repertoires – in contrast to the majority of 'shared song types' shared by nightingales from the same 'neighbourhood' – is described as created through 'invention', 'recombination' of learned songs and as a consequence of 'immigration' of male nightingales from other territories (Sprau and Mundry 2010).

> "The interpretation of unshared song types being recombinations, modifications or inventions is supported by the fact that the frequent occurrence of song types being unshared or shared only among a few males shows a striking similarity with the power law-like distributions found in several cultural traits of humans, which, it is suggested, arise through a combination of random copying and cultural mutation (i.e. 'invention'; e.g. Hahn & Bentley 2003; Bentley et al. 2004; Mesoudi & Lycett 2009)." (2010, 432)

The analysis of these dynamics is mostly conducted by comparison of spectrograms digitally produced out of the recorded data. What is interesting to notice is that in this translation the sonic mode of embodied being in place is turned into a knowing practice that is eminently visual. Moreover, affective experiences are valued differently from representational ones, the latter being quantifiable and thus easily inscribed into outputs.

Staying close to the acoustic experience then, in a way 're-sounding' the more-than-human encounters beyond a human-centred visual functionality of the acoustic data, would not only add a layer to the exploration of the content theme of the CS project itself, it would also support a more nuanced exploration on what kind of 'participation' is made valuable and to what purpose. What thinking about how multispecies sonic worlds come together in the project would entail? How could such dynamics be also part of what counts as knowledge in the CS practices?

---

[2] Animal behaviour practices are grounded on the evolutionary interpretation of 'male-male' singing interactions as part of the sexual selection theory. Feminist scholars and historians of science have addressed critically the entanglement and historicity of this biological key theory with normative rationalizations of gender roles and relations (see among others Malin Ah-King; Anne Fausto-Sterling; Ruth Hubbard; Erika Lorraine Miliam; Banu Subramaniam; Griet Vandermassen).

As Joanna Latimer and Mara Miele write about scientific research and experimentations, a *natureculture* approach "(…) is about understanding how the specificities of the relations among the different elements of a scientific endeavour (being assembled, composed and imagined, as associations and disassociations), affects a) the kinds of experiments being done, b) the interpretations of their significance and c) the knowledge and understandings produced." (Latimer and Miele 2013, 25). Re-sounding nightingales-humans' relations is proposed thus as a way to re-articulate scientific observations by adding new layers to the experience accounted for by public engagement technologies – CS in this case – and their modes of codifying, standardizing and circulating it across platforms and through inscriptions such as reports, guidelines, evaluations and peer-reviewed publications. This re-entanglement nevertheless, beyond promises of conviviality, makes visible also the multiplicity of possible positions, conflicting ones included, on issues such as urban space management and the associated politics and economies or the existing modes of using public space in urban contexts that challenge modern categories of private and public.

Fig. 3 - Guided Tour in Tiergarten, Berlin (13.06.2018) - Photo by Chiara Garbellotto

Showing how relations in scientific contexts are already also embodied and affective relations, Maria Puig De La Bellacasa has proposed to re-think matters of concerns as 'matters of care' (2017). Moving from theorizations of care by authors such as Joan Tronto and Annamarie Mol, Maria Puig De la Bellacasa underlines the 'non-innocence' of the concept of care, pointing at the situatedness of the human responsibilities in specific environments, historicity and embodied relationalities. Beyond a conception of care as either 'destructive or paternalistic stewardship' of nonhumans, she asks "How do we acknowledge their agency without denying the asymmetrical power historically developed by human agencies in bios?" (Puig de la Bellacasa 2010, 159). To this point, in the introduction to the edited book 'Tiergarten, Landscape of Transgression (This Obscure Object of Desire)', published as result of the symposium with the same name hosted at the *Haus der Kulturen der Welt* in 2015, the architects and curators Sandra Bartoli and Jörg Stollmann specifically address the issue of nightingale presence in the main city park:

> "Current park management policies are at work to "tame" Tiergarten, as an example, by making it spatially more accessible for the public. The degree of accessibility, however, is a key to its balance: in 2012 there were thirty-two nightingale couples; in 2015 only eight were left. Bushes and trees, the birds' breeding environment, have been cut down in order to discourage certain forms of social use. Plant control thus becomes social control." (Bartoli and Stollmann 2019, 11)

Geographer Chris Wilbert responds to this statement in his chapter 'More-than-human heritage spaces: Stories from Hoo to Tiergarten':

> "It is necessary to include animals as active beings in what occurs in our lives, and much of this storying and phenomenological-influenced work discusses respectfulness, conversation, and openness. But focusing on the spaces and places of people with animals and other entities means also engaging with things like capitalism, markets, and histories of land changes and the forces involved." (Wilbert 2019, 219)

Addressing the politics of the relations between the invited and uninvited more-than-human actors in public engagement could find a starting point in the acknowledgement of the plurality of modes of relating that are part of participatory assemblages such as the CS Nightingale project, not only in terms of different epistemologies but also in terms of multisensory, affective and embodied constituents of lived experience. Attending at the situatedness and complexity of such assemblages helps also making visible how doing such form of museum CS works on one hand through the re-assembling of specific histories of scientific concerns and practices in the experimentation and professionalization of the CS field; on the other hand, how local multiple repertoires of living in the city and caring for environmental and animal issues are also performed through the museum of natural history. These two processes, as I will try to make evident in the final section, can be productively explored when the categorizations of 'scientists' and 'citizens' or 'science' and 'culture' are not intended as differential identities and realms structuring the project but as objects themselves of some kind of collaborative work in CS.

DISCUSSION

As I attempted to show through a glimpse into the ethnographic case, moving from a *natureculture* approach in researching on museum public engagement in the area of scientific practice entails a mode of accounting the experiences of 'participating' and 'knowing' environmental relations less linear and definitive than what museum technologies of accountancy and communication usually necessitate[3]. Difficulties and uneasiness, as well as unspoken affective atmospheres of uncertainty, confusion and disinterestedness can all be part of mediated practices of public engagement, more or less voiced by the actors. The short-term life of third-party funded projects like this one – in the case of the FFN the 3 initial funded years were cut to 2 years – was for instance commented by one of the team leaders during a private conversation as one of the difficulties in dealing with the kind of work necessary to sustain and support the relations within the newly formed 'community'. In my research, I aim at weaving together this scale of the processual and open-ended experience with broader ones at which the CS assemblage also operates. Two emerged so far as particularly crucial in the ethnographic field: the ecology of spaces and times where and when the engagement with nightingales in all their different versions (i.e. as living beings, as data, as metaphors, as visual representations) unfolds as part of the actors' diverse lives; the intersection existing in museums of natural history daily life between practices of biodiversity studies and *Wissenstransfer* in its more participatory acceptation embodied in professional careers development and in the doing and undoing of alliances to specific practitioners' groups. At this intersection is where in fact the professionalization of two museum practitioners appears to occur: that of 'participation expert' and that of 'citizen scientists'.

---

[3] The aimed outputs defined by the FFN team members, who designed the project as part of the governmental funding scheme and who are professional biologists, were the production of the species' population distribution map, peer-reviewed publications and conferences presentations in both the biology and CS sectors as well as the dissemination of the collected stories from the participants in digital or printed form.

In this last section, I intend to present a work-in-progress discussion of the two mobilised ideas of 'knowing nature' and 'participating in science' introduced in the initial section, this time by attempting to re-articulate them in the light of the situated ethnographic case presented. A final section will allow me to propose how ethics of care in the feminist tradition permit to make a step further in the analysis and provide a possible way to think institutional CS beyond an a-political acceptation of 'citizenship'.

'KNOWING NATURE'

As previously mentioned, the wording 'knowing nature' was voiced multiple times by the FFN's team members as the requisite to achieve what can be acknowledged as the ethical aim of the participatory project, namely 'caring for nature'[4]. Moving from an understanding of 'knowing' as plural, relational and material-semiotic and from an interest in ontological politics, my research questions then what counts as 'knowledge' in this CS assemblage and how the relation to 'care' is conceived. The categorization of 'scientific' and 'cultural/artistic' modes of knowing in the project – as well as the 'educational' one concerning the outreach work with young students – is a visible representational mode of ordering the programme's conception and production. Besides this formal structuring nevertheless, attending at the embodied and affective qualities of the lived experiences I took part in my research brings to the attention less linear and defined differences among knowing processes, which, processual and open-ended in their unfolding, are at the same time fragmented and fluid in correlation to the specific pace at which participants perform their engagement, even if throughout a longer period than a single event.

The question of what counts as 'knowledge' works thus in my research at the level of the management and development of the project and in response to the kind of access I could negotiate with the team, which consisted in more exchange with the museum

---

[4] Personal conversation with one of the project's leaders (18.10.2018).

organisers than with the external participants. Despite this limitation, it does question the mediation of citizen science as a straightforwardly accountable practice as it is communicated in documents and papers produced by CS and governmental bodies[5]. It also points at the limited attention given to dynamics for which participatory practices are deemed so relevant to both scientific and museum settings and, most importantly, from which these institutions gain legitimacy and funding. Fascination and wonder – especially in relation to the idea of 'nature' – sense of well being, gratification and involvement but also concern, provocation and dissent are some of the possible embodied and affective conditions experienced by people when making use of museums programmes, beyond an understanding of engagement as purely intentional and induced by defined motivations. This is particularly relevant to underline considering how the concept of 'participation' has been framed by the specialised practitioners in the context of the 'participatory turn' at the MfN as a re-distribution of power in the knowledge production processes of science. This position, defined particularly by on of the museum practitioners as the more 'political' among different ones, voiced the intentions of making the researched conducted at the MfN more 'visible' outside the places and times they usually exist and of actually taking into account the input from 'participants' or 'stakeholders'. A note about the necessity of making such contributions fitting to the institution itself, its theme and practices accompanied this position[6]. The accent on the cognitive content of participation reflects the need to articulate the complexity of knowing processes in terms compatible with those of the scientific practices and, especially in the museum context, their communication.

---

[5] Some examples are: 'Citizen Science and Citizen Engagement - Achievements in Horizon 2020 and recommendations on the way forward' by the European Commission (2020); 'Zusammenfassung der Ergebnisse aus dem Regionaldialog „Wissenschaft, öffne dich! Wissenschaft und Gesellschaft als Motor für Innovation" in Berlin. Beteiligungsprozess zur Weiterentwicklung der Hightech-Strategie 2025 ' by Zebralog and Fraunhofer ISI with the participation of the members of the High-Tech Forum (HTF) on behalf of the German Ministry for Education and Research (BMBF) (2020); 'Green Paper. Citizen Science Strategy 2020 for Germany' edited by the platform Citizens Create Knowledge and "developed with the input of over 700 participants from 350 organisations, scientific institutions, learned societies, non-governmental organisations and civic societies, foundations, and private individuals." (2016).

[6] Interview (31.07.2019)

Ethical and political motivations for infrastructuring participatory projects and producing a coordinating discursive and logistical framework for them are grounding the current institutionalization of citizen science at the MfN, which in turn has become a push for science researchers to experiment with CS project in their field. The researched project was the first one developed internally at the MfN to include multiple approaches to the scientific theme[7] and coincided with years of high activity on the side of the museum itself to establish and produce platforms, policies, publications and networks for the whole German-speaking areas. Among the different projects that are part of the partner platform *Bürger Schaffen Wissen* (Citizens Create Knowledge), described in the website as 'the central platform for citizen science in Germany', a particularity of the Nightingale project can be acknowledged in its inclusion of a symbolic perspective on the species addressed and the relative interest in exploring literary production and personal memories about these birds from different times and from the multiple geographical areas where they live. The choice of ordering the different scopes of the project according to broad disciplinary differentiations – science, culture and arts – structured its complexity according to pre-existing epistemological borders that construct the formats as existing side by side in the search for data and information to gather. Moving from the theoretical approach of ontological politics, different knowledge practices nevertheless not only describe the same reality in different ways: they enact it differently, meaning that actors and materialities *do things* differently according to specific practices (Mol 2002).

In my research I could recognise 'nightingales' as multiple: they were done as species as part of the educational practices of literacy enhancement and identification training; as

---

[7] The professionalised area of Citizen Science has been developing at the MfN in relation to the existing volunteering scheme, which included non-employed people, both trained and not trained in scientific disciplines, working according to different contract formats in different departments as well as the tour guides and education practitioners. 'Special Interest Groups' working in entomology, mineralogy and palaeontology, as well as the *Deutscher Jugendbund für Naturbeobachtung* ('German Youth Association for Nature Observation'), have also been affiliated to the museum, some since the end of the XXIX century. More strictly recognisable as CS in the acceptation here discussed, the more recent projects 'Amphibian Taskforce' (2016-2017), 'Berlin collects cosmic dust' (2019-2020) and 'Bees, pollination and citizen science in Berlin's gardens' (2020). The MfN is also directly involved in the organization of CS events such as the 'BioBlitz' and the 'City Nature Challenge' formats.

data in the bioacoustic practices of collecting, analysing and cataloguing songs types; as metaphors in the practices of memory- and story-telling; they were also living individuals in the moments of new or recurring encounters occurring in different spaces and times of peoples' lives. The distribution of such ontological difference across these practices is made more or less visible as part of the project and different nightingales are related to each other through certain forms of coordination, translation and also through unplanned interferences (ibidem. 2002). Considering that in the project there is not a complete separation between team members according to the different practices involved being them all biologists, the differentiation between the modes of doing nightingales emerged as a particularly useful strategy in dealing with the intersecting scales at which the project was working. To the purpose of my research though, I draw a direct line between this mode of structuring the project and the consequences on its 'everyday' enactment that it has and the possibilities it gives to all actors to participate in knowing practices in a way that is meaningful to them.

'PARTICIPATING IN SCIENCE'

As just mentioned, the project materialised at multiple scales. That of locality, for instance, emerged through the ethnographic approach as a central one, interweaving different elements: the specificity of the city of Berlin – with the dense historicity of both its urban landscape and the civic engagement in environmental urban politics (Lachmund 2013) – of the humans-birds relation at stake, of the digital sensing technologies adopted and of the diverse ecology of cultural, environmental and political production in the city of which the MfN is also part of. The undifferentiated sphere of 'science' is also a material-semiotic product of the project that brings it at a different scale: nightingales, technologies, concepts and scientists themselves exist in fact also in a detached abstract space where the contingencies of the data production and their analysis disappear by means of discursive narratives but also through performative enactment of presentations and technologies used during the formats. The sphere of 'the museum' is equally abstractable as uniform and consistent entity filling an

imagined gap between the scientific world and an imagined 'society', which is engendered as political from the very beginning through the designation of participants as 'citizens'.

Working with the concept of assemblage helps considering how these scales are brought together during the life span of the project not only when people gathered together during the programmed events or when the team worked at its production, development and post-production. The different actors involved, myself included with my ethnographic research, have been performing the project itself in different ways, mobilising differently the 'nightingale multiple'. An example is a comment by one of the team members who, during a private conversation, voiced an interpretation of people's participation as related to the wish of 'having a good time and good relations with the museum – even with the cashier'. Indeed, differently from this relational explanation, a view on participation that thinks people's participation only in terms of rational choice fails to grasp those dimensions of this social practice that are not immediately accountable through standardized visitors' profiling or explicable through cognitive learning processes. Participatory projects in scientific institutions engaging with environmental issues have been productively researched by STS and environmental politics studies by asking how scientific knowledges were mobilised by the interested stakeholders to different purposes in terms of deliberative negotiations. Since the Nightingale project was not designed to engage particular local groups already mobilising around a common issue in a more strictly political sense and was instead ideated with the two-folded aim of 'opening scientific research' and 'raising awareness on biodiversity', such scholarship does not directly resonate with the ethnographic field where the museum epistemology plays a big role in the mode the assemblage formed. To understand how doing nightingales in this context engendered a particular version of the relation between the ideas of 'knowing nature' and 'caring for nature', considering the doings *of* nightingales, as well as those of technology, allows instead for a more complex description of such dynamics.

As one of the team leaders shared during a private conversation, the animals themselves at the centre of the CS interest contribute actively to the definition of the project design possibilities: since every animal works differently, every CS project needs to adapt to its animal of choice. Another example of the situatedness of the project appears in the relation traced between the local club culture and the nightingales' singing behaviour, with the particular association to nightly temporality and atmosphere. Public spaces such as city parks and the transport infrastructure of Berlin plays also an essential role in the possibility for the project to occur and bring to the attention the acquaintance with which the guided tours' participants were able to navigate successfully the city at night. Another related example would be the technicians and gardeners who maintain the parks where nightingales nest and are being recorded by CS participants. The interdependence of actors in museum public engagement, as for what it concerns all social practices, entails a distribution of the power to define such dependencies, also by making certain ones visible and others invisible in the narration do the practice. The mutual need for scientists and participants to the successful unfolding of the project – i.e. scientists need participants for data gathering and participants need scientists for the validation of their input – can in fact be explored in correlation to the mobilisation by project members of concepts referring to collectivities such as 'community' and 'new Berliners'.

These two terms were used to define especially the group of participants who engaged in the project through the Berlin-based association The Neighbourhood Museum (*Nachbarschaftsmuseum*), which specifically works with local groups, 'eye-witnesses and interested groups, schools and institutions outside the education sector' as they are defined in the official web page[8], in order to activate cooperation between them and museums. Already in contact with the MfN through one of the practitioners working on participatory programmes, the association was founded in 1991 and has a long-term experience in working with themes of migration, cultural diversity and *Heimat* as they are experienced in the everyday life of residents in Berlin. Beyond the history of this

---

[8] www.nmuseum.org accessed on 30.12.2020

association, the explicit decision to initiate collaboration with some of the people affiliated to this association renders especially crucial understanding the more-than-human interdependency between the CS project participants in relation to ideas of belonging and visibility. It is also in any case useful to keep in mind also the specific history of neighbourhood museums and the ethical and political positioning they have been building up vis-à-vis national institutions, especially through community outreach.

Significant to the realization of the 'cultural' activities in the CS project – even if, as it was already mentioned, the stories collected from these participants were less than expected – this collaboration can be recognised from a research point of view as an entry point to understanding at what scale the concept of 'citizenship' appeared and in connection to which material-semiotic dynamics concerning in between humans and animals lives. In a recent article from the East Asian STS network, historian of science Fa-ti Fan and sociologist of science Shun-Ling Chen discuss the tension between empowerment and government potential of CS, highlighting the unavoidable positioning of every CS project in certain political conceptions of democracy. An imagination of a 'politico-scientific community' (Fan and Chen 2019, 1, footnote), they argue, is thus always implicit in such assemblages but, in its most institutionalized version, CS team rarely address this possible collective imagining practice and mobilises ideas of 'citizen' and 'scientific' communities as abstract and universal:

> '(…) citizen science tends to glide over such concepts as state, citizen, and the public and to assume that the reader will understand what they mean. This confidence originates in part from the fact that the default political framework of the discourse is usually Western (particularly Anglo-American). As a result, one often easily accepts a commonsense notion of participatory liberal democracy as the reference framework.' (Fan and Chen 2019, 182)

And further in the article:

> 'The stated goal is to build a "distributed community of citizen scientists" for the advancement of science. In this kind of citizen science, citizenship is membership in an idealized open scientific community. Here citizenship is not associated with the state or territoriality, but with a cosmopolitan community of scientific commonwealth.' (Fan and Chen 2019, 185)

The authors offer in their article an analytical differentiation between the four most common modes of doing CS at the moment according to different modes of imagining the 'political-scientific community': 'Cosmopolitan Community of Knowledge', 'Science, State, and Citizen', 'Democracy and Justice' and 'Civic Commons and Techno-Social Infrastructures'. Having emerged as part of different spheres within mostly Western-centric societies, all four can be acknowledged as present in the Berlin context where the Nightingale project was produced. I find this categorization interesting not much because of the possibility it offers to identify to which one every project belongs to, but because it boldly brings into light the entity of the effort of centralization and institutionalization put in place in the German-speaking countries and the role that the MfN has in it. Attending ethnographically to the situatedness of the project unfolding is, once more, a way to re-locating (re-sounding) CS in its places of enactment. The histories of *Bürgerbeteiligung*, of environmental sciences and movements in the separate Germany, of urban planning, estate building explosion and gentrification processes after the reunification and, not least, of governmental management of people moving across borders as the consequence of both political and environmental crisis 'elsewhere': could these located social processes have a place in the activation of participatory projects that 'care' about the risk of extinction in urban contexts due to human-centred architecture and landscape development and management? Could this mode of knowing about nightingales be interweaved with bioacoustic and animal behavioural research beyond a centralized and normative selection of how to care? Going back to the feminist perspective that I will re-introduce in the next and final section, the response-ability in weaving more-than-human relations with ethical purposes of 'caring for nature' cannot innocently avoid a commitment to a political acceptation of 'participation' that critically addresses the assembling power of CS and public engagement work.

PROPOSITION

It is to Maria Puig de la Bellacasa that I turn in this open-ended, conclusive section. In dialogue with this author, I am developing my analytical work on the ethnographic case here presented and more broadly on the concept of museum' public engagement as a practice of care[9]. To the purpose of this report, the author's theorization of a feminist and more-than-human sensibility to politics and ethics of care, especially in relation to contemporary scientific and technological endeavours, represents a fundamental guide in thinking about the plurality and the situatedness of modes of knowing and caring for more-than-human worlds and indeed about non-innocent responsibilities coming with it. The 'care' she writes about, together with other thinkers such as Donna Haraway, Lucy Suchman, Annamarie Mol, Susan Leigh Star and Geoffrey Bowker, clearly challenges a normative and moral interpretation of the verb and instead questions how the meaning of 'good' care is developed and what role have invisible actors in it. Most of all though, beyond an interpretation of caring as an inclusive mission that aims at holding 'everyone' together in a humanistic and liberal acceptation, her theorization is fundamental in avoiding the risk of replicating a universal and unproblematic 'we' in deciding who are 'all' the actors to be involved. When thinking about how MfN practitioners are voicing the current necessity to identify 'non-publics' and 'possible users', especially in relation to the in-the-making digitized collections, it is very crucial to recognise what kinds of 'openness' the questioning of 'How many are we?" does without a problematization of 'how to count with agencies that do not fit or cannot even be heard' (ibidem. 2017, 51). The question thus turns into 'Who and what counts as a 'countable' actor'?

---

[9] The discussion on museum ethics through care has been developing in the last years (see Morse 2020; Morse and Munro 2018; Woodham, Hess, and Smith 2020). Recent projects working with the concept of care in relation to museums, both materially and symbolically, are the working group 'Museum of Care' initiated by Nika Dubrovsky and David Graeber (2020); the book *Museum of Care. The Latvian Collection of Malmö Konstmuseum* edited by independent curator Lotte Løvholm about a forgotten collection of 45 Latvian artworks (2019); the European Cooperation project 'TAKING CARE - Ethnographic and World Cultures Museums as Spaces of Care' led by the Weltmuseum Wien (2019).

A second line of thought developed in the referenced book concerns the response-able and speculative proposition of what the author refers to in terms of the question 'how to learn how to care?' The question emerges particularly in relation to engagement with science and technology practitioners. Critiquing Latour's critique of critical constructivism, de la Bellacasa writes:

> 'The ethico-political wariness and disempowerment that self-righteousness of being "on the right side" generates can only aggravate if commitments to oppose forms of power and domination in science and technology are limited to what Latour sees as simplistic (dis) articulations of the world. (…) Fostering care should not become the equivalent of an accusatory moral stance–if only *they* would care!–nor can caring knowledge politics become a moralism disguised in epistemological accuracy: show that you care and your knowledge will be "truer".' (ibidem. 2017, 60)

I take this quote as the starting point for the work to be done as part of my research, a proposition to think further what the author names 'dissenting-within'. In a place such as a museum of natural history where, as I recalled in the very introduction of this report, practitioners from different trainings and disciplines work alongside each other both at distance and through collaboration, the commitment to develop ethics of care as 'cultivated relatedness in diverseness' is an ethical stance grounded not much on a moral conciliatory attitude, but on the engaged concept of feminist standpoint. Re-thinking museum public engagement and participatory work as modes of doing care offers a generative guideline to think about how to approach the experimentation and implementation of projects through an on-going and explicitly reflexive 'maintenance' of those invisible technologies, objects, human and non-human subjects allowing the experimentation to happen. Finding modes of caring in this acceptation is thus not a mean to find final, all-encompassing or universal procedures, even though museums institutions do work mainly as ordering and coordinating dispositifs. Re-affecting relations and modes of knowing about more-than-human environments appears thus as a way to resist such centripetal force and to the creation of compartmentalised spheres of participatory practice within museums, where multiple modes of knowing and caring with different ethics remain separated.

REFERENCES

Agrawal, Arun. 2002. 'Indigenous Knowledge and the Politics of Classification'. *International Social Science Journal* 54 (173): 287–97. https://doi.org/10.1111/1468-2451.00382.

Anderson, B., and P. Harrison. 2016. *Taking-Place: Non-Representational Theories and Geography*. Taylor & Francis. https://books.google.de/books?id=1YTeCwAAQBAJ.

Asdal, Kristin. 2008. 'Enacting Things through Numbers: Taking Nature into Account/Ing'. *Geoforum* 39 (1): 123–32. https://doi.org/10.1016/j.geoforum.2006.11.004.

Bäckstrand, Karin. 2004. 'Scientisation vs. Civic Expertise in Environmental Governance: Eco-Feminist, Eco-Modern and Post-Modern Responses'. *Environmental Politics* 13 (4): 695–714. https://doi.org/10.1080/0964401042000274322.

Bartoli, S., and J. Stollmann. 2019. *Tiergarten, Landscape of Transgression: This Obscure Object of Desire*. Park Books. https://books.google.de/books?id=KwqZDAEACAAJ.

Bartsch, Conny, Henrike Hultsch, Constance Scharff, and Silke Kipper. 2016. 'What Is the Whistle All about? A Study on Whistle Songs, Related Male Characteristics, and Female Song Preferences in Common Nightingales'. *Journal of Ornithology* 157 (1): 49–60. https://doi.org/10.1007/s10336-015-1245-y.

Bartsch, Conny, Michael Weiss, and Silke Kipper. 2015. 'Multiple Song Features Are Related to Paternal Effort in Common Nightingales'. *BMC Evolutionary Biology* 15 (1). https://doi.org/10.1186/s12862-015-0390-5.

Bartsch, Conny, Ronja Wenchel, Annemarie Kaiser, and Silke Kipper. 2014. 'Singing Onstage: Female and Male Common Nightingales Eavesdrop on Song Type Matching'. *Behavioral Ecology and Sociobiology* 68 (7): 1163–71. https://doi.org/10.1007/s00265-014-1727-6.

Bayer, N., B. Kazeem-Kaminski, and N. Sternfeld. 2018. *Curating as Anti-Racist Practice*. Aalto University Publication Series Art + Design + Architecture. Aalto University, School of Arts, Design and Architecture. https://books.google.de/books?id=fy7kuQEACAAJ.

Bird Rose, Deborah, and Thom Van Dooren. 2012. 'Storied-Places in a Multispecies City'. *Humanimalia: A Journal of Human/Animal Interface Studies* 3 (2).

Bogusz, Tanja. 2018. 'Doing Biodiversity'. In *Experimentalismus Und Soziologie. Von Der Krisen- Zur Erfahrungswissenschaft*, 65–90. Frankfurt a.M. & New York: Campus.

Bowker, Geoffrey C. 2000. 'Biodiversity Datadiversity'. *Social Studies of Science* 30 (5): 643–83. https://doi.org/10.1177/030631200030005001.

Byrne, J., E. Morgan, N. Paynter, A.S. de Serdio, and A. Zeleznik. 2018. *The Constituent Museum: Constellations of Knowledge, Politics and Mediation : A Generator of Social Change*. L'Internationale Series. Valiz. https://books.google.de/books?id=zwNztAEACAAJ.

Cameron, Fiona R. 2018. 'Posthuman Museum Practices'. In *Posthuman Glossary*, edited by Rosi Braidotti and Maria Hlavajova, 349–52. London ; New York: Bloomsbury.

Chilvers, Jason, and Matthew Kearnes, eds. 2016. *Remaking Participation: Science, Environment and Emergent Publics*. London ; New York: Routledge is an imprint of the Taylor & Francis Group.

Chilvers, Jason, Helen Pallett, and Tom Hargreaves. 2018. 'Ecologies of Participation in Socio-

Technical Change: The Case of Energy System Transitions'. *Energy Research & Social Science* 42 (August): 199–210. https://doi.org/10.1016/j.erss.2018.03.020.

Couze, Venn. 2006. 'A Note on Assemblage'. *Theory, Culture & Society* 23 (2–3): 107–8. https://doi.org/10.1177/026327640602300218.

Das, Subhadra, and Miranda Lowe. 2018. 'Nature Read in Black and White: Decolonial Approaches to Interpreting Natural History'. *Journal of Natural Science Collections*, no. 6: 4–14.

DeLanda, Manuel. 2016. *Assemblage Theory*. Edinburgh University.

Despret, Vinciane. 2013. 'Responding Bodies and Partial Affinities in Human–Animal Worlds'. *Theory, Culture & Society* 30 (7–8): 51–76. https://doi.org/10.1177/0263276413496852.

Devictor, Vincent, and Bernadette Bensaude-Vincent. 2016. 'From Ecological Records to Big Data: The Invention of Global Biodiversity'. *History and Philosophy of the Life Sciences* 38 (4). https://doi.org/10.1007/s40656-016-0113-2.

Dhillon, Carla M. 2020. 'Indigenous Feminisms: Disturbing Colonialism in Environmental Science Partnerships'. *Sociology of Race and Ethnicity*, February, 233264922090860. https://doi.org/10.1177/2332649220908608.

Elam, Mark, and Margareta Bertilsson. 2003. 'Consuming, Engaging and Confronting Science The Emerging Dimensions of Scientific Citizenship.Pdf'. *European Journal of Social Theory* 6 (2): 233–51.

Ellis, Rebecca, and Claire Waterton. 2004. 'Environmental Citizenship in the Making- the Participation of Volunteer Naturalists in UK Biological Recording and Biodiversity Policy'. *Science and Public Policy* 31 (2): 95–105.

Escobar, A. 2018. *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds*. New Ecologies for the Twenty-First Century. Duke University Press. https://books.google.de/books?id=dX1AswEACAAJ.

Escobar, Arturo. 1998. 'Whose Knowledge, Whose Nature? Biodiversity, Conservation, and the Political Ecology of Social Movements'. *Journal of Political Ecology* 5 (1): 53–82.

———. 2016. 'Thinking-Feeling with the Earth: Territorial Struggles and the Ontological Dimension of the Epistemologies of the South'. *AIBR, Revista de Antropología Iberoamericana* 11 (1): 11–32. https://doi.org/10.11156/aibr.110102e.

Fan, Fa-ti, and Shun-Ling Chen. 2019. 'Citizen, Science, and Citizen Science'. *East Asian Science, Technology and Society* 13 (2): 181–93. https://doi.org/10.1215/18752160-7542643.

Gabrys, Jennifer. 2016. *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*. Electronic Mediations 49. Minneapolis: University of Minnesota Press.

Gad, Christopher, Casper Bruun Jensen, and Brit Ross Winthereik. 2015. 'Practical Ontology: Worlds in STS and Anthropology'. *Natureculture*, 67–86.

Gellner, D., and E. Hirsch. 2020. *Inside Organizations: Anthropologists at Work*. Taylor & Francis. https://books.google.de/books?id=YzPpDwAAQBAJ.

Gibson, Katherine, Deborah Bird Rose, and Ruth Fincher, eds. 2015. *Manifesto for Living in the Anthropocene*. Brooklyn, NY: Punctum Books.

Grosfoguel, Ramón. 2011. 'Decolonizing Post-Colonial Studies and Paradigms of Political-Economy: Transmodernity, Decolonial Thinking, and Global Coloniality'. *TRANSMODERNITY: Journal of Peripheral Cultural Production of the Luso-Hispanic World* 1 (1). https://escholarship.org/uc/item/21k6t3fq.

Haraway, D.J., L.M. Randolph, and Routledge. 1997. *Modest-Witness@Second-Millennium.FemaleMan-Meets-OncoMouse: Feminism and Technoscience*. Cultural Studies. Science Studies. Routledge. https://books.google.de/books?id=ftO4jLQ2RM8C.

Haraway, Donna. 1988. 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective'. *Feminist Studies* 14 (3): 575–99.

———. 2018. *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse: Feminism and Technoscience*. Second edition. New York, NY: Routledge, Taylor & Francis Group.

Harrison, Rodney. 2015. 'Beyond "Natural" and "Cultural" Heritage: Toward an Ontological Politics of Heritage in the Age of Anthropocene'. *Heritage & Society* 8 (1): 24–42. https://doi.org/10.1179/2159032X15Z.00000000036.

Harvey, Matthew. 2009. 'Drama, Talk, and Emotion: Omitted Aspects of Public Participation'. *Science, Technology, & Human Values* 34 (2): 139–61. https://doi.org/10.1177/0162243907309632.

Haywood, Benjamin K. 2014. 'A "Sense of Place" in Public Participation in Scientific Research: PUBLIC PARTICIPATION IN SCIENTIFIC RESEARCH'. *Science Education* 98 (1): 64–83. https://doi.org/10.1002/sce.21087.

Hinchliffe, Steve. 2017. 'Sensory Biopolitics: Knowing Birds and a Politics of Life'. In *Humans, Animals and Biopolitics: The More than Human Condition.*, edited by Kristin Asdal, Tone Druglitro, and Steve Hinchliffe, 152–70. Abingdon: Routledge.

Hinchliffe, Steve, and Sarah Whatmore. 2006. 'Living Cities: Towards a Politics of Conviviality'. *Science as Culture* 15 (2): 123–38. https://doi.org/10.1080/09505430600707988.

Janes, R.R., and R. Sandell. 2019. *Museum Activism*. Museum Meanings. Taylor & Francis. https://books.google.de/books?id=ofiCDwAAQBAJ.

Jasanoff, Sheila. 2004. 'Science and Citizenship. A New Synergy'. *Science and Public Policy* 31 (2): 90–94.

———. 2017. 'Virtual, Visible, and Actionable: Data Assemblages and the Sightlines of Justice'. *Big Data & Society* 4 (2): 205395171772447. https://doi.org/10.1177/2053951717724477.

Kamel, Susan. 2016. 'How Access-Iting? Museums as Cultural Educators or Shelters of Knowledge'. In *Contemporary Curating and Museum Education*, 117–30. transcript. https://doi.org/10.14361/9783839430804-011.

Kiefer, Mitchell. 2020. 'Re-Basing Scientific Authority: Anthropocene Narratives in the Carnegie Natural History Museum'. *Science as Culture*, May, 1–23. https://doi.org/10.1080/09505431.2020.1766010.

Kiefer, S., C. Scharff, H. Hultsch, and S. Kipper. 2014. 'Learn It Now, Sing It Later? Field and Laboratory Studies on Song Repertoire Acquisition and Song Use in Nightingales'. *Naturwissenschaften* 101 (11): 955–63. https://doi.org/10.1007/s00114-014-1236-5.

Kimura, Aya H., and Abby Kinchy. 2016. 'Citizen Science: Probing the Virtues and Contexts of

Participatory Research'. *Engaging Science, Technology, and Society* 2: 331–61. https://doi.org/10.17351/ests2016.099.

Knudsen, Line Vestergaard. 2016. 'Participation at Work in the Museum'. *Museum Management and Curatorship* 31 (2): 193–211. https://doi.org/10.1080/09647775.2016.1146916.

Lachmund, J. 2013. *Greening Berlin: The Co-Production of Science, Politics, and Urban Nature*. Inside Technology. MIT Press. https://books.google.de/books?id=QM_oUUGMT2sC.

Landkammer, Nora. 2016. 'Visitors or Community? Collaborative Museology and the Role of Education and Outreach in Ethnographic Museums'. In , edited by Carmen Mörsch, Angeli Sachs, and Thomas Sieber, 269–80. transcript Verlag.

Latimer, Joanna. 2013. 'Being Alongside: Rethinking Relations amongst Different Kinds'. *Theory, Culture & Society* 30 (7–8): 77–104. https://doi.org/10.1177/0263276413500078.

Latimer, Joanna, and Mara Miele. 2013. 'Naturecultures? Science, Affect and the Non-Human'. *Theory, Culture & Society* 30 (7–8): 5–31. https://doi.org/10.1177/0263276413502088.

Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Clarendon Lectures in Management Studies. OUP Oxford. https://books.google.de/books?id=AbQSDAAAQBAJ.

Lave, Rebecca. 2012. 'Neoliberalism and the Production of Environmental Knowledge'. *Environment and Society* 3 (1). https://doi.org/10.3167/ares.2012.030103.

Law, John. 2009. 'Actor Network Theory and Material Semiotics'. *Social Theory*, 141.

———. 2019. 'Material Semiotics'. www.heterogeneities.net/publications/Law2019MaterialSemiotics.pdf.

Law, John, and Marianne Lien. 2012. 'Slippery: Field Notes on Empirical Ontology'. *Social Studies of Science* 43 (3): 363–78. https://doi.org/10.1177/0306312712456947.

Law, John, and Annemarie Mol. 2002. *Complexities: Social Studies of Knowledge Practices*. Duke University Press.

Law, John, and Vicky Singleton. 2014. 'ANT, Multiplicity and Policy'. *Critical Policy Studies* 8 (4): 379–96. https://doi.org/10.1080/19460171.2014.957056.

Lezaun, Javier, Noortje Marres, and Manuel Tironi. 2016. 'Experiments in Participation'. In *Handbook of Science and Technology Studies, Volume 4*, edited by E Miller, Smitt-Doer, Felt, and Fouche,. Cambridge: MIT Press.

Light, Ann, and Yoko Akama. 2014. 'Structuring Future Social Relations: The Politics of Care in Participatory Practice'. In *Proceedings of the 13th Participatory Design Conference on Research Papers - PDC '14*, 151–60. Windhoek, Namibia: ACM Press. https://doi.org/10.1145/2661435.2661438.

L'Internationale online, ed. 2016. *Ecologising Museums*. https://www.internationaleonline.org/bookshelves/ecologising_museums.

Lynch, Bernadette T. 2011. 'Collaboration, Contestation, and Creative Conflict: On the Efficacy of Museum/Community Partnerships'. In *The Routledge Companion to Museum Ethics*, 146–63. Routledge.

Macdonald, Sharon. 2002. *Behind the Scenes at the Science Museum*. Materializing Culture. Berg Publishers. https://books.google.de/books?id=9b04A44G754C.

Macdonald, Sharon, Christine Gerbich, and Margareta von Oswald. 2018. 'No Museum Is an Island: Ethnography beyond Methodological Containerism'. *Museum and Society*, 138–56.

Mahony, Nick, and Hilde C. Stephansen. 2016. 'The Frontiers of Participatory Public Engagement'. *European Journal of Cultural Studies* 19 (6): 583–97.

Mahr, Dana, and Sasha Dickel. 2019. 'Citizen Science beyond Invited Participation: Nineteenth Century Amateur Naturalists, Epistemic Autonomy, and Big Data Approaches Avant La Lettre'. *History and Philosophy of the Life Sciences* 41 (41). https://doi.org/10.1007/s40656-019-0280-z.

Marres, Noortje. 2012. *Material Participation: Technology, the Environment and Everyday Publics*. Houndmills, Basingstoke, Hampshire ; New York: Palgrave Macmillan.

Meyer, Morgan. 2010. 'Caring for Weak Ties - the Natural History Museum as a Place of Encounter between Amateur and Professional Science'. *Sociological Research Online* 15 (2): 1–14. https://doi.org/10.5153/sro.2149.

Michael, Mike. 2012. '"What Are We Busy Doing?": Engaging the Idiot'. *Science, Technology, & Human Values* 37 (5): 528–54. https://doi.org/10.1177/0162243911428624.

Mol, A. 2002. *The Body Multiple: Ontology in Medical Practice*. Duke University Press. Duke University Press. https://books.google.de/books?id=qdltz8N9qSEC.

Mörsch, C., A. Sachs, and T. Sieber. 2016. *Contemporary Curating and Museum Education*. Edition Museum. transcript Verlag. https://books.google.de/books?id=t02wDQAAQBAJ.

Morse, N. 2020. *The Museum as a Space of Social Care*. Critical Studies in Heritage, Emotion and Affect. Taylor & Francis. https://books.google.de/books?id=oKb8DwAAQBAJ.

Morse, Nuala. 2018. 'Patterns of Accountability: An Organizational Approach to Community Engagement in Museums.' *Museum and Society* 16 (2): 171–86. https://doi.org/10.29311/mas.v16i2.2805.

Morse, Nuala, and Ealasaid Munro. 2018. 'Museums' Community Engagement Schemes, Austerity and Practices of Care in Two Local Museum Services'. *Social & Cultural Geography* 19 (3): 357–78. https://doi.org/10.1080/14649365.2015.1089583.

Morse, Nuala, Bethany Rex, and Sarah Harvey Richardson. 2018. 'Editorial: Methodologies for Researching the Museum as Organization'. *Museum & Society* 16 (12): 112–23.

Nadim, Tahani. 2016. 'There Might Be a Wasp in My Biodiversity Soup: Dodgy Organisms after Numbers'.

Onciul, Bryony. 2015. *Museums, Heritage and Indigenous Voice: Decolonizing Engagement*. 1st ed. Routledge. https://doi.org/10.4324/9781315770246.

Ottinger, Gwen. 2015. 'Is It Good Science? Activism, Values, and Communicating Politically Relevant Science'. *Journal of Science Communication* 14 (02): C02. https://doi.org/10.22323/2.14020302.

Pizarro, J. Cristobal, and Brendon M. H. Larson. 2017. 'Feathered Roots and Migratory Routes: Immigrants and Birds in the Anthropocene'. *Nature and Culture* 12 (3): 189–218. https://doi.org/10.3167/nc.2017.120301.

Puig de la Bellacasa, María. 2010. 'Ethical Doings in Naturecultures'. *Ethics, Place & Environment* 13 (2): 151–69. https://doi.org/10.1080/13668791003778834.

Puig De La Bellacasa, Maria. 2017. *Matters of Care: Speculative Ethics in More than Human Worlds*. U of Minnesota Press.

Rader, K.A., and V.E.M. Cain. 2014. *Life on Display: Revolutionizing U.S. Museums of Science and Natural History in the Twentieth Century*. EBL-Schweitzer. University of Chicago Press. https://books.google.de/books?id=Pc9jBAAAQBAJ.

Rito, C., and B. Balaskas. 2020. *Institution as Praxis: New Curatorial Directions for Collaborative Research*. Sternberg Press. https://books.google.de/books?id=BwORzQEACAAJ.

Somerville, Margaret, and Frances Bodkin. 2016. 'Featherlines: Becoming Human Differently with Earth Others'. In *Becoming Earth*, edited by Anne B. Reinertsen, 65–83. Rotterdam: SensePublishers. https://doi.org/10.1007/978-94-6300-429-9_7.

Sprau, Philipp, and Roger Mundry. 2010. 'Song Type Sharing in Common Nightingales, Luscinia Megarhynchos, and Its Implications for Cultural Evolution'. *Animal Behaviour* 80 (3): 427–34. https://doi.org/10.1016/j.anbehav.2010.05.028.

Sprau, Philipp, Tobias Roth, Valentin Amrhein, and Marc Naguib. 2013. 'The Predictive Value of Trill Performance in a Large Repertoire Songbird, the Nightingale *Luscinia Megarhynchos*'. *Journal of Avian Biology* 44 (6): 567–74. https://doi.org/10.1111/j.1600-048X.2013.00113.x.

Stage, Carsten, and Karen Ingerslev. 2016. 'Participation as Assemblage: Introducing Assemblage as a Framework for Analysing Participatory Processes and Outcomes'. *Conjunctions. Transdisciplinary Journal of Cultural Participation* 2 (2): 117. https://doi.org/10.7146/tjcp.v2i2.22923.

Star, Susan Leigh, and James R. Griesemer. 1989. 'Institutional Ecology, `Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39'. *Social Studies of Science* 19 (3): 387–420. https://doi.org/10.1177/030631289019003001.

Stengers, Isabelle. 2005. 'An Ecology of Practices' 11 (1): 183–96.

Strathern, Marylin. 1980. 'No Nature, No Culture: The Hagen Case.' In *Nature, Culture and Gender.*, edited by C. MacCormack and Marilyn Strathern, 174–222. Cambridge University Press.

Sung, Ha-Cheol, and Shi-Ryong Park. 2005. 'Explaining Avian Vocalizations. A Review of Song Learning and Song Communication in Male-Male Interactions.' *Integrative Biosciences* 9 (2): 47–55.

Takacs, D. 1996. *The Idea of Biodiversity: Philosophies of Paradise*. Johns Hopkins University Press. https://books.google.de/books?id=MPoTAQAAIAAJ.

Thorpe, Charles. 2010. 'Participation as Post-Fordist Politics: Demos, New Labour, and Science Policy'. *Minerva* 48 (4): 389–411. https://doi.org/10.1007/s11024-010-9157-8.

Thorpe, Charles, and Jane Gregory. 2010. 'Producing the Post-Fordist Public: The Political Economy of Public Engagement with Science'. *Science as Culture* 19 (3): 273–301. https://doi.org/10.1080/09505430903194504.

Thrift, Nigel J. 2008. *Non-Representational Theory: Space, Politics, Affect*. International Library of Sociology. London: Routledge.

Tuck, Eve, and K Wayne Yang. 2012. 'Decolonization Is Not a Metaphor'. *Decolonization: Indigeneity, Education & Society* 1 (1): 1–40.

Turnhout, Esther, and S. H. Boonman-Berson. 2011. 'Databases, Scaling Practices, and the Globalization of Biodiversity'. *Ecology and Society* 16 (1): 35–35.

Waterton, C., R. Ellis, and B. Wynne. 2013. *Barcoding Nature: Shifting Cultures of Taxonomy in an Age of Biodiversity Loss*. Genetics and Society. Taylor & Francis. https://books.google.de/books?id=lXYdAAAAQBAJ.

Waterton, Emma, and Jason Dittmer. 2014. 'The Museum as Assemblage: Bringing Forth Affect at the Australian War Memorial'. *Museum Management and Curatorship,* 29 (2): 122–39. https://doi.org/10.1080/09647775.2014.888819.

Weiss, M., H. Hultsch, I. Adam, C. Scharff, and S. Kipper. 2014. 'The Use of Network Analysis to Study Complex Animal Communication Systems: A Study on Nightingale Song'. *Proceedings of the Royal Society B: Biological Sciences* 281 (1785): 20140460–20140460. https://doi.org/10.1098/rspb.2014.0460.

Weiss, Michael, Sarah Kiefer, and Silke Kipper. 2012. 'Buzzwords in Females' Ears? The Use of Buzz Songs in the Communication of Nightingales (Luscinia Megarhynchos)'. Edited by Therésa M. Jones. *PLoS ONE* 7 (9): e45057. https://doi.org/10.1371/journal.pone.0045057.

Wilbert, Chris. 2019. 'More-than-Human Heritage Spaces: Stories from Hoo to Tiergarten.' In *Tiergarten: Landscapes of Transgression.*, edited by Sandra Bartoli and Barrett Stollmann Jörg, 210–19. Zürich: Park Books.

Winthereik, Brit Ross, and Helen Verran. 2012. 'Ethnographic Stories as Generalizations That Intervene'. *Science & Technology Studies*.

Woodham, A., A. Hess, and R. Smith. 2020. *Exploring Emotion, Care, and Enthusiasm in Unloved Museum Collections*. Collection Development, Cultural Heritage, and Digital Humanities Series. Arc Humanities Press. https://books.google.de/books?id=9z1ttAEACAAJ.