INTRODUCTION

THE ANTHROPOLOGY OF MALARIA: LOCATING THE SOCIAL

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Media teaser

In this twentieth anniversary issue on malaria, we trace changes in global health and social studies landscapes, opening new avenues for the anthropology of malaria.

This special section follows 20 years after a special issue in *Medical Anthropology*, edited by Randall Packard and Peter Brown (1997), that focused on malaria control worldwide. While a lot has changed since then, many issues remain salient. In his commentary at the end of this section, Peter Brown reviews the relationship between anthropology and malaria control since the 1997 issue, and an earlier 1983 issue on anthropology and disease control. In this introduction, we reflect on the roles of medical anthropology in malaria control efforts, today and in the future. Following in the footsteps of the 1997 special issue, the authors of the articles in this collection demonstrate the value of up-ending assumptions of how the global health community imagines and responds to malaria. The 1997 authors provided an extremely useful anchor point – and required reading – in the medical anthropology of malaria. They set out important historical, political and economic facets of malaria control efforts, in particular the ways in which malaria was framed as an economic and development issue in different places and times, and the consequences of this for its control and for people affected by the disease. Packard's and Brown's introductory observations of the assumed importance of productivity of the world's populations, in arguing for and setting out a malaria agenda, pre-empted the huge shifts in malaria goals and funding that have since taken place. Since the 'international health' scene of 1997 was superseded by 'global health', the links between economics and malaria has only intensified.

We began this critical discussion in a workshop, 'Reimagining malaria', held at the London School of Hygiene & Tropical Medicine in 2014. Through a series of papers taking anthropological and historical perspectives, we interrogated the shifts in the last 20 years of malaria control and debated its implications. Our group aimed to locate the social in the current strategies' strong focus on technological solutions, and to bring to the fore how the wide scale implementation of these technologies interacts with, but importantly also excludes, other social, infrastructural, and economic aspects that affect health systems'

capacities to adopt standardized solutions. The articles here bring our attention to different ways in which we can see what malaria is today.

In this introduction, we first review the substantial changes in global health regarding malaria in the past two decades. We then discuss concurrent shifts in social science approaches over this time. These have included more detailed attention to a wider range of material and stronger engagements with different philosophies of thought, moving analyses beyond the traditional domain of the 'social' defined in contrast with the 'natural'. We introduce each of the articles in this section in the light of these shifts in malariology and anthropology. Each illustrates how malaria as a problem is narrowed for political and funding purposes, the dangers of applying these simplified narratives of malaria as targets, and how we may reapply knowledges of malaria in its complexity to more effective solutions. We end with propositions for how the approaches and findings of these articles can prompt new ways to refresh global perspectives on malaria.

THE ROAD TO ERADICATION, PART II: MALARIA POLICIES SINCE 1997

Since 1997, the malaria community has witnessed a paradigm shift. When the previous malaria special issue was published, malaria eradication was a failed attempt of 1950/60s policies (Litsios 1997; Packard 2007). Ten years on, in 2007, the attempt to eradicate malaria made a surprising comeback, and this focus has since dominated the mind-sets, scientific publications, and funding streams in R&D and hands-on malaria interventions. In this context, the paradigm shifted to international malaria *control*, with emphasis on access to and the provision of malaria care to patients in need. This shift was consistent with broader developments in global public health, dating from the *Alma Ata Declaration* in 1978 and its emphasis on 'primary health care' for all to organize global health needs (World Health Organization and United Nations Children Fund 1978). The end of the twentieth century eradication campaign, however, also resulted in a drastic fall in funding for interventions

specifically targeted at malaria. Some argue that as a consequence, the decades until the mid 2000s were characterized by a resurgence of malaria cases (World Health Organization 2005: 12). Others suggested that increasing resistance to chloroquine was the most influential factor in the resurgence of infection (Greenwood, et al. 2005).

Significant political changes in malaria control had started to take place by 1997. In 1998 WHO, UNICEF, UNDP, and the World Bank founded a common malaria initiative, Roll Back Malaria (RBM), to coordinate international malaria control activities. RBM was joined by ever more partners, and when the most recent reform process started in 2015, it comprised of over 500 partners from seven constituencies: malaria-endemic countries, multilateral development partners, OECD donor countries, private sector, non-governmental and community-based organizations, private foundations, and research and academic institutions. While RBM formally began as a 'cabinet project' within the WHO, it was also seen as an experiment in partnering with other organizations. As illustrated by these constituencies, this partnering went quickly beyond the realm of multilateral organizations. RBM became an important international public-private partnership (PPP); it was eventually also influenced by the philanthrocapitalist spirit and, like many other organizations, it became committed to an ethos that "to do good socially, one must do well financially" (McGoey 2012:185). In many ways this spirit exemplifies the current policy and funder configuration of malaria today, assembled through a proliferation of partnerships (Gerrets 2015). RBM's mission has been to coordinate and streamline these partnerships, to develop a global strategy and importantly, to "mobilize for action and resources" (RBM Webpage, 2009). While RBM was an important actor in the 2000s, bringing a diverse set of organizations into conversation with each other and orchestrating malaria strategy and funding, it has undergone significant restructuring. Julian Eckl, this issue, analyses these recent changes in detail.

Shortly after RBM was established, a second Public Private Partnerships (PPPs) entered the stage in global health. In 2001 *The Global Fund against HIV/AIDS, Tuberculosis and Malaria* (The Global Fund) was established as a major international funding initiative against the 'big three' killer diseases in the world. The Global Fund receives most of its resources through voluntary governmental donations, but the initiative proposed that its partnership approach "represents a new approach to international health financing" (The Global Fund 2005:5). In the 2000s, the Global Fund was indispensable for the procurement of artemisinin combined therapy (ACT) malaria medication in endemic countries, financially enabling the shift towards ACTs in response to resistance. Until the end of 2015, the Global Fund had financed the delivery of 582 million drug treatments, the distribution of 659 million bednets to populations at risk, and provided support for insecticide spraying, education and other prevention efforts (http://www.theglobalfund.org/en/malaria, 2016). However, together with funds, the Global Fund brought its own bureaucratic, accounting and application logic, leading to "increasing bureaucratization and an undermining of the Fund's own intentions to award life-saving grants according to need" at national level (Taylor and Harper 2014:206).

A third major player, which entered the malaria policy stage in the 2000s with a significant impact on malaria control policies, was the Bill and Melinda Gates Foundation (Gates Foundation). Emerging in 1999, its financial investment and influence in global health grew quickly, not least because its philanthrocapitalist outlook was propagated by other actors as well and has had a huge impact on global health and development more broadly (McGoey 2015). Malaria became one of its *cause célèbre*, and the Gates Foundation invests considerably into the fight against malaria until today. In comparison, the budget of the WHO Global Malaria Programme is negligible. One consequence is that the WHO applies for funds to the Gates Foundation, so enabling this private foundation to use its resources as a leverage to shape global social and health policy (Eckl 2014).

The Gates Foundation has also been instrumental in a recent shift from a 'global malaria control paradigm' to a revival of a 'malaria elimination and eradication agenda', with its official comeback at a meeting organized by the Gates Foundation in Seattle in 2007. The foundation's call for eradication took many by surprise – especially those in the scientific community whose members were intimately familiar with the history of malaria control and the resilience of this complex disease. Global malaria eradication as an explicit program goal ceased in 1969, and few malaria experts would have expected its return. Meanwhile, the discussion evolved into a debate on eradication or elimination with the latter term referring to eradication in a local or national setting while the former was reserved for global eradication. The return to eradication was framed as a bold and 'audacious' move by Gates to reinvigorate the optimism of science policy of the 1950s. But unlike the state-driven funding of the first eradication campaign, contemporary support for large-scale scientific endeavours is underpinned by public-private partnerships, international research collaborations and largescale development donors. With these so-called 'e-words' firmly back on the international agenda, elimination in particular has increasingly dominated the work plans of the international community (World Health Organization 2015).

Global malaria eradication continues to be a complex balancing act. The dangers of an international community that has lost interest and confidence can not only be seen in the last eradication campaign, where funding levels could not be maintained long enough (Litsios 1996), but are also already evident in the latest Global Malaria Report, in which Margaret Chan declares: "The need for more funding is an urgent priority. In 2015, malaria financing totalled US\$ 2.9 billion. To achieve our global targets, contributions from both domestic and international sources must increase substantially, reaching US\$ 6.4 billion annually by 2020" (World Health Organization 2016:V). While malaria funding almost quadrupled from 2000 - 2010, funding has now stagnated.

Others are more optimistic about the prospects of elimination and eradication. When asked what he thought made eradication of malaria more feasible today than, say, 50 years ago, Robert Newman, the former Director of the WHO Global Malaria Programme responded: "First, the tool kit is broader. People know that it's not going to happen with a single wonder drug or insecticide, but a complicated mix of insecticide-treated nets, indoor residual spraying, better diagnostic testing, better antimalarials and new tools on the horizon ..." (Newman 2011:10). Admitting that history has taught health planners some lessons, and that the control and potential eradication of malaria requires more than one magic bullet, Robert Newman and the global malaria control strategy nevertheless rely on a technologycentred ideology. This ideology follows the logic of scientific discovery where an object can be controlled by the intelligent and rational application of technologies. It leaves the social and the political on the outside, much in the way James Ferguson described his 'anti-politics machine' (Ferguson 1994; Harper and Parker 2014). The social in this logic becomes a mere factor in implementation where in particular irrational behavior or ignorance can hinder the correct application of a mix of technologies. It has always been a core mission of scholarly work in the anthropology of malaria to complicate these assumptions. In the following we review this work.

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In the following, we first provide an overview of the most established approach in medical anthropology of understanding the social lives of malaria and strategies for its control. We then review approaches more recently adopted in anthropology, influenced by broader changes in position and focus in the social sciences more generally. We consider the utility of 'malaria multiple' and 'naturecultures of malaria' as ways to extend our research palate. The four articles that follow this introduction illustrate engagement with these second two sets of approaches to an anthropology of malaria. They show how ethnographic work can illuminate

the ways in which malaria is defined and implemented as a problem, in large part a narrowed-down version of a complex reality, as well as how it may be possible to see beyond this narrow framing in order to produce richer accounts through which to locate sites for intervention. We see this as an important step for anthropological approaches to change the very nature of malaria in our common conceptions within science and beyond. Achieving this requires different engagement with malaria as a topic and with malaria science and policy, inspired by recent moves away from a preoccupation only with 'the social', towards encompassing the messiness of material, semiotic and biotic realities. This includes a double move of firstly writing the social into the fabric of the material, and thus extending it beyond its usual scope (Brown, et al. 2015), and then opening up the biomedical technologies and strategies to social scientific scrutiny and involvement.

SOCIAL LIVES OF MALARIA

Numerous questions have arisen for anthropologists around how to give voice to the suffering of malaria, how to situate malaria control efforts in local contexts to meet local needs, and how to adjust such programs to maximize potential. This has led to an impressive body of work that presents the ways in which people understand and respond to malaria in different places, and how malaria control programs can employ their anti-malarial technologies more effectively. This work has primarily been based on the use of an ethnographic approach to eliciting local perspectives and responses (see for example Agyepong and Manderson 1999). A key characteristic of this work has been to situate these technologies in local social context, including health systems and histories (for a useful introduction, see Whyte, et al. 2002). Such research has been productive in providing the malaria community with an understanding of malaria realities for those suffering and vulnerable (reviewed in Jones and Williams 2004; Williams and Jones 2004), for learning about care pathways (for example

Hausmann Muela, et al. 1998; Ribera and Hausmann-Muela 2011; Samuelsen 2004), and to understand those tasked to provide care (whether public health workers, community volunteers or traditional healers, for example Chandler, et al. 2012; Maes and Kalofonos 2013; Marsland 2007). Medical anthropologists have been able to identify why certain malaria technologies such as bednets (Gryseels, et al. 2015) or particular drug regimens (Grietens, et al. 2010) are poorly taken up, and how others become accepted as acts of citizenship, as in the case of indoor residual spraying in Mozambique (Montgomery, et al. 2010). Anthropologists have also described unintended consequences of malaria control interventions such as following the implementation of rapid diagnostic tests (RDTs) (Beisel, et al. 2016; Hutchinson, et al. 2014; Hutchinson, et al. 2015). We have also explored the tensions between assumedly 'modern' biomedicine and 'traditional' medicines, such as the Chinese herb *qinghaosu* (artemisinin), carefully tracing its complex trajectories into proprietary drug markets and destabilizing easy demarcations between biomedical and traditional (Hsu 2009).

MALARIA MULTIPLE

Over recent years analyses inspired by science and technology studies have shaped medical anthropology. This has encouraged close engagements by anthropologists not only with the social lives of disease, but also with the biomedical, technological and biological matters making up diseases, their control and treatment practices. Expanding the social beyond its traditional realm has opened up new fields of inquiry, and is based on the assumption that the social is crucially implicated in the making of disease (Latour 1993[1984]). This destabilizes purely biomedical explanations, and avoids the relegation of the social outside of the disease through concepts such as 'social determinants of disease'. If this boundary is broken down, the social is located both inside and outside of disease. The social and material constitute

disease together, and disease-making has to be understood as a material-semiotic process (Law 2007).

The last decades have seen a general turn towards relational theories in social theory, where the investigation of flows and networks has taken center stage. Relational theories emphasise knowledge production not only as an epistemological act, but as a *doing* – a practice that involves creating worlds and that shapes ontologies (Law 2004; Mol 2002). This entails a turn to multiplicity, suggesting "that we are no longer living in the modern world, located within one single *epistème*. Instead, we discover that we are living in different worlds" (Law and Mol 2002:8). Studies in this school of thought have destabilized binaries of local/global, big/small, knowing/being, general/specific, and instead scrutinize complex connections, the moments when diverse elements come together.

This means that if as social scientist we want to learn more about the character of a disease, we need to look not only at the social determinants, the societal conditions and social causes of disease, but also the biomedical and scientific practices of disease-making – practises of defining diseases, of making them scientifically visible and readable, efforts in prevention, control, diagnosis and treatment. To illustrate: in her seminal book *The Body Multiple*, a study of arteriosclerosis in a Dutch hospital, Annemarie Mol (2002) shows how medical technologies, arteries, doctors and patients enact disease together in medical practice, and how different versions of arteriosclerosis emerge through these practices. These different ontological enactments of disease which Mol presents to us are not a plea for pluralism, but are rather meant to draw attention to acts of coordination, interference and contradiction in medical practices. While, to Mol, the body is multiple, it is an "intricately coordinated crowd" (Mol 2002: viii): quoting Marilyn Strathern, it is "more than one, and less than many" (82).

However, malaria is not atherosclerosis, and it is not typically treated in hospitals in the Netherlands. Rather it is a disease primarily prevalent in tropical and often resource-poor countries in the majority world (that is, the Global South). This makes diagnosis and treatment practices look rather different. If we want to understand how malaria is enacted and done in places with fragile health care infrastructures, it is not sufficient to concentrate on hospitals and laboratories; it requires tracing how these practices tally with self-diagnosis, self-treatment or treatment by healers and traditional medicine (Langwick 2007). This is important: by many people living in transmission areas, malaria is considered to be an ordinary, everyday danger (Kamat 2006), not an issue of high biopolitical priority (Gerrets 2012). Most malaria cases remain treated at home. A juxtaposition of biomedical and 'other' practices locates malaria not only in the biomedical sphere, but onto the streets, quite literally, as for instance, Kelly and Lezaun show in their analysis of mosquito breeding places (Kelly and Lezaun 2013). As social scientists, we have to pay attention to both: the formal health care sciences and practice, and informal and improvised practices that are part of juggling everyday life. These different ways to know, treat and heal disease have to be folded into each other (Hinchliffe and Ward 2014). Malaria multiple cannot hold big and small, local and global, general and specific, abstract and concrete neatly apart. The analysis starts from the moment of practice itself – the habitual coming-together of diverse elements and practices.

NATURECULTURES OF MALARIA

For much of scientific 'enlightenment', our imagery of infectious disease has relied on the compartmentalism of human, parasite, insect and environmental realms. Characterized by linear arrows and cyclical feedback loops, the infection of humans is depicted in terms of pathogens traversing these realms. In this perspective, humans are considered separate (and separable) from the 'natural' reservoirs of infectious disease (Lynteris 2016). Through

technological apparatuses such as DDT extermination, physical barriers were created that are characteristic of 'hygienic modernity' (Rogaski 2004), imagining a disease-free future humanity separated from the dangerous parts of nature.

Social science research has recently begun to challenge such imagined boundaries, prompting new ways of seeing disease. From these perspectives, depictions of arrows, drivers, factors, as linear processes of infection from the outside in, have become increasingly insufficient to account for disease. Although biomedically seen, parasites and mosquitoes are central to the constitution of malaria, their changing habitats and habits, and biochemical plasticity, are less commonly included in social science accounts of malaria. As David Turnbull put it: "For most of us, malaria appears as a natural entity in the world ... although malaria can be viewed as a natural entity uniquely specifiable as the consequence of parasitic invasion, it can also be visualised as a complex of interactions, providing the conditions for constituting the disease as a specific natural entity through a social process of selective definition of malaria and response" (1989:285-6).

The move towards relational practices of disease-making has been accompanied by widening the definition of what counts as agents of disease. The territory opened up to investigations shifting away from a culture-or-nature perspective to a multispecies frame of entangled naturecultures (Haraway 2008; Kirksey and Helmreich 2010). This allows for possibilities to engage in biological as well as cultural research trajectories (Tsing 2012). For infectious disease research, the lives of insects (Beisel, et al. 2013; Kelly and Lezaun 2013; Nading 2014), microbes (Hird 2009; Landecker 2015) and viruses (Keck 2015; Lowe 2010; Porter 2013) have increasingly come into view. The assumption of a stable and singular context of disease has been side-lined in favor of highlighting the interactivity of pathogenic things and places (Brown and Kelly 2014). Narratives of emergence and disappearance of disease can then be expanded with concepts of entanglement, spider webs, and ecologies that

allow us to see material and biotic interdependencies (Clark 2011; Jimenez Forthcoming; Nading 2013).

Human and multispecies practices of malaria combine to define and locate malaria 'in the middle of things' as a socially, biologically and spatially complex phenomenon (Beisel 2010). Malaria comes to the fore as a result of multiple and complex hosting practices - of human bodies (involuntarily) hosting parasites and mosquitoes, of mosquitoes hosting parasites, but also of experimental huts hosting entomological science on malaria (Kelly 2012). Malaria control practices in this vein have been analysed as experiments in multispecies separation (Beisel 2015; Kelly and Lezaun 2014) and as "practices of continual co-existence" (Kelly and Beisel 2011:83).

THE ARTICLES

The articles that follow are inspired by these new developments in anthropology (and beyond). The authors conceptualize malaria as a genuinely biosocial process, and therefore do not reduce 'the social' to humans, or disease to nature. Rather, they conceptualize malaria as a multispecies assemblage of human, mosquito and parasite trajectories. Understanding and juxtaposing malaria practices brings the shifting contours of malaria to the fore, including in political and scientific practices and propositions, and allows for the emergence of new possibilities for understanding and addressing malaria. The articles are ordered such that readers may first consider, through Julian Eckl's article, how the well-known complexities of malaria have been narrowed down to particular interpretations of the disease that prevail over others in global policies and targets; secondly, engage through Marlee Tichenor's article with the messiness of the reality of constructing certainties to meet these narrowed definitions and counts; thirdly envision through Rene Umlauf's article the

possibilities for seeing beyond these definitions by resisting dominant narratives of where malaria is situated, in this case foregrounding the work of institutions; and fourthly, anticipate through Ann Kelly's article the potential for new and more productive spheres of disease management outside of conventional domains for technological intervention.

Julian Eckl provides a clearly narrated insight into the ways in which malaria has become defined as a problem and the arenas deemed appropriate for solutions. He resists the temptation to portray malaria policy as inevitable, and instead points to the social process of its negotiation. By hovering over some of the tensions and conflicts within the malaria community, he alerts us to the complexities of malaria, but also, the strong desire or requirement for consensus on a technical-biomedical model of problem and solution. He ably illustrates this through drawing on contemporary ethnographic and historical material, reminding us that the social dimension of malaria has long been recognized but only ever given a role as companion of technical-biomedical models. This points us to the potential for alternative paths to be taken for policy, perhaps through leaving tensions and contradictions open rather than closing them down in the name of consensus. One consequence of subscribing to such an approach would be to move beyond a narrow focus on the universal application of technological solutions and engage with the socio-technical and political character of antimalarial measures; another consequence would be to take a critical stance on the idea that aiming directly and immediately at a world free from malaria would selfevidently be the best way forward. Irresistible as it may sound, the notion of a disease-free future has historically not proven to be a conclusive solution, but a catalyst for the development of resistances. Alternative approaches to sustainability, however, would not necessarily reduce malaria to a problem of parasites or vectors.

Marlee Tichenor allows us to zoom in on the ambiguities of defining and counting malaria. By focusing on data production, she enables us to see how the preconceived ideas of

malaria as a problem are reinforced through the counts made. Yet so much about what malaria is, that should be conveyed for useful action, gets left out of these accounts. She traces the efforts of those tasked with counting malaria cases on the ground in Senegal, counts that will be synthesized with other data into reports to national and international levels, eventually to leverage funding for country efforts. In so doing, data from home visits construct a particular version of malaria. In the process, 'problems encountered' aspects of life that are fundamentally important for malaria control, such as the major flooding of whole neighbourhoods, are excluded. We also see how the ambiguities of identifying malaria through diagnostics at health facilities are obscured in the concreteness of enumerated reports. The case of the Senegalese health workers' strike, withholding routine patient data from the Ministry of Health to draw attention to ongoing dissatisfaction with working conditions, indicates how many actors recognize the links between these figures and funding. The possibility, however, for these data to be filled out through projections from other sources raises further questions over management of both staff and uncertainty. We thus learn of how approximated data 'stand in for malaria' at a global level, where the uncertainties of the lab, clinic, data extraction, data synthesis, and of 'filling out' are masked by the need for certainty. These accounts leave one wondering of the utility of these figures for malaria control: the very intentions of funding that follow accountability in order for better targeting of interventions appear undermined as the loss of granularity in the counting process disables possibilities to inform responsive intervention.

How and where malaria is defined and enacted are taken up again in René Umlauf's article, which offers a fresh look at malaria medicine use and diagnostic strategies. Moving away from narrowed definitions and goals as laid out in somewhat abstract targets (as discussed by Tichenor), Umlauf introduces new ways to reinterpret practices, for example of presumptive treatment not as merely 'incorrect' but as 'preparedness' in contexts of precarity.

Umlauf proposes bringing institutional work to the fore, rather than accepting this as a takenfor-granted backdrop. Based on fieldwork in Uganda, he demonstrates that by focusing on
institutional work, the policy change that replaces presumptive treatment of malaria with
RDTs can be understood as a de-stabilization of a relatively stable and strong institution of
care. This policy change is in effect a new form of regulating the relation between economic
and biomedical aspects of access to antimalarial drugs. Consequently, when a consultation
results in non-adherence to a negative RDT result, this can be seen as institutional work of
maintaining access to antimalarials that operates against the reductionist tendencies of the
devices. Umlauf observes that this inversion of the anticipated objective of RDTs, in which
health workers should decide who does and does not qualify for antimalarials, responds in
part to the inadequacies of existing health infrastructures. By foregrounding institutional
work, we are able to situate the algorithmic-based RDT guidelines in a context that goes far
beyond detection and response to malaria antigens.

Ann Kelly, Hermione Boko Koudakossi and Sarah Moore's article continues to take us beyond universal simplified understandings of sites for malaria control. Their fieldwork on mosquito encounters in peri-domestic settings in urban Benin and Florida draws attention to the limitations of the household as a socio-spatial unit of public health intervention. Spatial repellents challenge demarcations between public and private space, stretching our categories of domestic space. The authors propose the notion of 'vicinity' to incorporate the yards, lawns, gutters and alleyways that are often overlooked in defining the domestic. This presents alternative possibilities for considering malaria control, including spatial repellants as 'controlled atmosphere'. The authors contribute to the conceptualization of interventions through a critical approach. A key challenge is how to 'do' intervention on a different scale to the household-oriented approach through which much public health intervention is oriented, organized and counted.

In these articles, the authors alert us to the processes of making policy, counting for targets, implementing policy and broadening our view for interventions. As they illustrate, the apparent imperative for narrowing down the problem of malaria into something tangible for policy and tracking has implications for the sorts of solutions seen as appropriate and possible. It has increasingly been observed that the vision of available technological solutions also feeds into problem definition (Murray Li 2007). There is a place here too for incorporating critique of the focus on technical solutions for problems that can be defined far more broadly (Hausmann-Muela and Eckl 2015). This concern was raised in the 1997 special issue, many times since, and remains a concern today. In her introduction to the 2016 World Malaria Report, WHO Director General Margaret Chan re-emphasizes the tool-kit approach, "Across Africa, millions of people still lack access to the tools they need to prevent and treat the disease. ... To speed progress towards our global malaria goals, WHO is calling for new and improved malaria-fighting tools" (World Health Organization 2016:V).

In the articles that follow, we see ways in which medical anthropology may continue to engage fruitfully with public health topics such as malaria. By continuously attending to granularity and locality, it is possible to push beyond simplified, standardized tools for malaria control and measurement and move towards approaches that foreground and account for the different faces of malaria in different places. Such heterogeneity is well known by researchers, and likely by policy makers, but we often fail to revisit this after the effective narrowing down to a consensus 'stand in'. Whilst such narrowing down appears necessary for advocacy purposes, the consequences of this practice for programs are often unaddressed. Too often the local contours of malaria are abandoned in rejuvenated and technologically-focused global eradication efforts. This is where anthropologists can very usefully play a role — in revealing and reminding us of the processes through which certainties have been created, and in revisiting the complexities required in addressing malaria in context.

REFERENCES

Agyepong, I. A., and L. Manderson

1999 Mosquito avoidance and bed net use in the Greater Accra Region, Ghana. Journal of Biosocial Science 31(1):79-92.

Beisel, U.

2010 Who bites back first? Malaria control in Ghana and the politics of coexistence, The Open University.

2015 Markets and Mutations: mosquito nets and the politics of disentanglement in global health. Geoforum 66:146-155.

Beisel, U., A. H. Kelly, and N. Tousignant

2013 Knowing Insects: Hosts, Vectors and Companions of Science. Science as Culture 22(1):1-15.

Beisel, U., R. Umlauf, E. Hutchinson, and C. I. Chandler

2016 The complexities of simple technologies: re-imagining the role of rapid diagnostic tests in malaria control efforts. Malaria Journal 15(1):64.

Brown, H., and A. H. Kelly

2014 Material proximities and hotspots: toward an anthropology of viral hemorrhagic fevers. Medical Anthropology Quarterly 28(2):280-303.

Brown, H., A. H. Kelly, A. Marí Sáez, E. Fichet-Calvet, R. Ansumana, J. Bonwitt, N. F.

Magassouba, F. Sahr, and M. Borchert

2015 Extending the "Social": Anthropological Contributions to the Study of Viral Haemorrhagic Fevers. PLOS Neglected Tropical Diseases 9(4):e0003651.

Chandler, C. I. R., L. Mangham, A. N. Njei, O. Achonduh, W. F. Mbacham, and V. Wiseman

2012 'As a clinician, you are not managing lab results, you are managing the patient': How the enactment of malaria at health facilities in Cameroon compares with new WHO guidelines for the use of malaria tests. Social Science & Medicine 74(10):1528-35. Clark, N.

2011 Inhuman Nature. Sociable life on a dynamic planet. London: SAGE Publications Ltd.

Eckl, J.

2014 The power of private foundations: Rockefeller and Gates in the struggle against malaria. Global Social Policy 14(1):91-116.

Ferguson, J.

1994 The Anti-Politics Machinie: "Development," Depoliticization, and Bureaucratic Power in Lesotho. Minneapolis, MN: University of Minnesota Press. Gerrets, R.

2012 Governing Malaria. How an old scourge troubles precepts in social theory. *In* Rethinking Biomedicine and Governance in Africa. Contributions from Anthropology. P.W. Geissler, R. Rottenburg, and J. Zenker, eds. Pp. 23-42. Bielefeld: Transcript Verlag.

2015 International health and the proliferation of "partnerships": (un)intended boost for state institutions in Tanzania? *In* Para-states and medical science: making African global health (Critical global health: evidence, efficacy, ethnography). P.W. Geissler, ed. Pp. 179-206. Durham, NC: Duke University Press.

Greenwood, B. M., K. Bojang, C. J. Whitty, and G. A. Targett

2005 Malaria. Lancet 365(9469):1487-98.

Grietens, K. P., V. Soto, A. Erhart, J. M. Ribera, E. Toomer, A. Tenorio, T. G. Montalvo, H. Rodriguez, A. L. Cuentas, U. D'Alessandro, and D. Gamboa

2010 Adherence to 7-Day Primaquine Treatment for the Radical Cure of P. vivax in the Peruvian Amazon. The American Journal of Tropical Medicine and Hygiene 82(6):1017-1023.

Gryseels, C., L. Durnez, R. Gerrets, S. Uk, S. Suon, S. Set, P. Phoeuk, V. Sluydts, S. Heng, T. Sochantha, M. Coosemans, and K. Peeters Grietens

2015 Re-imagining malaria: heterogeneity of human and mosquito behaviour in relation to residual malaria transmission in Cambodia. Malaria Journal 14(1):165.

Haraway, D. J.

2008 When Species Meet. Minneapolis, MN: University of Minnesota Press.

Harper, I., and M. Parker

2014 The politics and anti-politics of infectious disease control. Medical Anthropology 33(3):198-205.

Hausmann-Muela, S., and J. Eckl

2015 Re-imagining malaria – a platform for reflections to widen horizons in malaria control. Malaria Journal 14(1):180.

Hausmann Muela, S. H., J. M. Ribera, and M. Tanner

1998 Fake malaria and hidden parasites — the ambiguity of malaria. Anthropology & Medicine 5:43–62.

Hinchliffe, S., and K. J. Ward

2014 Geographies of folded life: How immunity reframes biosecurity. Geoforum 53:136-144.

Hird, M. J.

2009 The Origins of Sociable Life: Evolution After Science Studies. Hampshire: Palgrave Macmillan UK.

Hsu. E.

2009 Chinese Propriety Medicines: An "Alternative Modernity?" The Case of the Anti-Malarial Substance Artemisinin in East Africa. Medical Anthropology 28(2):111-140. Hutchinson, E., C. Chandler, S. Clarke, S. Lal, P. Magnussen, M. Kayendeke, C. Nabirye, J. Kizito, and A. Mbonye

2014 'It puts life in us and we feel big': shifts in the local health care system during the introduction of rapid diagnostic tests for malaria into drug shops in Uganda. Critical Public Health:1-15.

Hutchinson, E., H. Reyburn, E. Hamlyn, K. Long, J. Meta, H. Mbakilwa, and C. Chandler 2015 Bringing the state into the clinic? Incorporating the rapid diagnostic test for malaria into routine practice in Tanzanian primary healthcare facilities. Global Public Health:1-15.

Jimenez, A. C.

Forthcoming Spider web anthropologies: ecologies, infrastructures, entanglements. In Indigenous Cosmopolitics: Dialogues for the Reconstitution of World. M. de la Cadena and M. Blaser, eds. Durham, NC and London: Duke University Press.

Jones, C. O., and H. A. Williams

2004 The social burden of malaria: what are we measuring? American Journal of Tropical Medicine & Hygiene 71(2 Suppl):156-61.

Kamat, V. R.

2006 "I thought it was only ordinary fever!" cultural knowledge and the micropolitics of therapy seeking for childhood febrile illness in Tanzania. Social Science & Medicine 62(12):2945-59.

Keck, F.

2015 Liberating sick birds: poststructuralist perspectives on the biopolitics of Avian Influenza. Cultural Anthropology 30(2):224-235.

Kelly, A. H.

2012 The experimental hut: hosting vectors. Journal of the Royal Anthropological Institute 18:S145-S160.

Kelly, A. H., and U. Beisel

2011 Neglected malarias: The frontlines and back alleys of global health. BioSocieties 6(1):71-87.

Kelly, A. H., and J. Lezaun

2013 Walking or waiting? Topologies of the breeding ground in malaria control. Science as Culture 22(1):86-107.

2014 Urban mosquitoes, situational publics, and the pursuit of interspecies separation in Dar es Salaam. American Ethnologist 41(2):368-383.

Kirksey, S. E., and S. Helmreich

2010 The Emergence of Multispecies Ethnography. Cultural Anthropology 25(4):545-576.

Landecker, H.

2015 Antibiotic Resistance and the Biology of History. Body & Society Published online before print March 13, 2015, doi: 10.1177/1357034X14561341.

Langwick, S.

2007 Devils, parasites and fierce needles: healing and the politics of translation in southeastern Tanzania. Science, Technology and Human Values 32(1):88-117.

Latour, B.

1993[1984] The Pasteurization of France. A. Sheridan and J. Law, transl. Cambridge, MA and London: Harvard University Press.

Law, J.

2004 After method: mess in social science research. London: Routledge.

2007 Actor Network Theory and Material Semiotics, version of 25th April 2007.

Law, J., and A. Mol

2002 Local entanglements or utopian moves: an inquiry into train accidents1. The Sociological Review 50(S1):82-105.

Litsios, S.

1996 The Tomorrow of Malaria. Wellington, NZ: Pacific Press.

1997 Malaria control, the cold war, and the postwar reorganization of international assistance. Medical Anthropology 17(3):255-278.

Lowe, C.

2010 Viral Clouds: Becoming H5N1 in Indonesia. Cultural Anthropology 25(4):625-649.

Lynteris, C.

2016 Untimely ends and the pandemic imaginary. Somatosphere 8th July 2016 online at http://somatosphere.net/2016/07/untimely-ends-and-the-pandemic-imaginary.

Maes, K., and I. Kalofonos

2013 Becoming and remaining community health workers: perspectives from Ethiopia and Mozambique. Social Science & Medicine 87:52-9.

Marsland, R.

2007 The modern traditional healer: locating 'hybridity' in modern Traditional Medicine, Southern Tanzania. Journal of Southern African Studies 33(4):751-765.

McGoey, L.

2012 Philanthrocapitalism and its critics. Poetics 40(2):185-199.

2015 No Such Thing as a Free Gift: The Gates Foundation and the Price of Philanthropy. London & Brooklyn, NY: Verso Books.

Mol, A.

2002 The Body Multiple: Ontology in Medical Practice. Durham, NC and London: Duke University Press.

Montgomery, C. M., K. Munguambe, and R. Pool

2010 Group-based citizenship in the acceptance of indoor residual spraying (IRS) for malaria control in Mozambique. Social Science & Medicine 70(10):1648-1655.

Murray Li, T.

2007 The Will to Improve: Governmentality, Development, and the Practice of Politics. Durham, NC: Duke University Press.

Nading, A. M.

2013 Humans, Animals, and Health: From Ecology to Entanglement. 4(1):60-78.

2014 Mosquito Trails. Ecology, Health and the Politics of Entanglement. Oakland, CA: University of California Press.

Newman, R. D.

2011 Learning to outwit malaria. Bulleting of the World Health Organization 89(1):10-1.

Packard, R.

2007 The Making of Tropical Disease: a Short History of Malaria. Baltimore: The Johns Hopkins University Press.

Packard, R. M., and P. J. Brown

1997 Rethinking health, development, and malaria: Historicizing a cultural model in international health. Medical Anthropology 17(3):181-194.

Porter, N.

2013 Bird flu biopower: Strategies for multispecies coexistence in Việt Nam. American Ethnologist 40(1):132-148.

Ribera, J. M., and S. Hausmann-Muela

2011 The straw that breaks the camel's back. Redirecting health-seeking behavior studies on malaria and vulnerability. Medical Anthropology Quarterly 25(1):103-21.

Rogaski, R.

2004 Hygenic Modernity. Meanings of Health and Disease in Treaty-Port China. Berkeley, CA: University of California Press.

Samuelsen, H.

2004 Therapeutic itineraries: the medical field in rural Burkina Faso. Anthropology & Medicine 11(1):27-41.

Taylor, E. M., and I. Harper

2014 The Politics and Anti-Politics of the Global Fund Experiment: Understanding Partnership and Bureaucratic Expansion in Uganda. Medical Anthropology 33(3):206-222.

The Global Fund

2005 The Global Fund Adds Force to Global Scale-up Against Diseases. Fact Sheet 26th January 2005.

Tsing, A.

2012 Unruly Edges: Mushrooms as Companion Species. Environmental Humanities 1:141-54.

Turnbull, D.

1989 The Push for a Malaria Vaccine. Social Studies of Science 19(2):283-300.

Whyte, S. R., S. Van der Geest, and A. Hardon

2002 Social Lives of Medicines. Cambridge: Cambridge University Press.

Williams, H. A., and C. O. Jones

2004 A critical review of behavioral issues related to malaria control in sub-Saharan Africa: what contributions have social scientists made? Social Science & Medicine 59(3):501-23.

World Health Organization

2005 World Malaria Report 2005. Roll Back Malaria Department.

World Health Organization

2015 Global Technical Strategy for Malaria 2016-2030. World Health Organisation.

World Health Organization

2016 World Malaria Report.

World Health Organization, and United Nations Children Fund

1978 Declaration of Alma Ata. Available online at

http://www.unicef.org/about/history/files/Alma_Ata_conference_1978_report.pdf.