Double trouble? Towards an epistemology of co-infection

MAT Medicine Anthropology Theory

ARTICLES

Double trouble?
Towards an epistemology of co-infection

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Abstract

Tuberculosis and HIV co-infection came to figure as one of the major global health problems at the beginning of the twenty-first century, with multiple attempts to tackle this intricate issue on epidemiological, clinical, and public health levels. In this article, we propose thinking beyond the practical problems caused by co-infections in order to explore medicine's epistemological attachment to the idea of single diseases, using TB/HIV as an analytical lever. We retrace how TB/HIV co-infection has been problematised in public health discourses since the 1990s, particularly in WHO reports and international public health journals, and show that it has been mainly discussed as a complex biosocial phenomenon in need of more resources. The epistemological interrogation of the concept of co-infection itself – as an entangled object of two or more diseases with different histories and social, political, and scientific identities – is largely missing. To elaborate on this gap, we look at the translational processes between the two diseases and their communities, and suggest concrete historical and ethnographic entry points for future research on this global health phenomenon.

Keywords

AIDS, tuberculosis, global health, Ludwig Fleck, history, anthropology

Medicine Anthropology Theory 2, no. 1: 1–31; https://doi.org/10.17157/mat.2.1.212

Introduction
#deadlyduo

During the twentieth international AIDS conference, held in Melbourne in 2014, two colourful creatures jumped around the convention and exhibition centre: a rather long, green stick with a funny face, licking its lips in pleasant anticipation, and a plump, purple ball, raising its eyebrows in pitiable despair. Under the hashtag #deadlyduo, the already significant global attention to the conference was supplemented by tweeted pictures of the human-sized plush figures – the green stick embodying TB and the purple ball incarnating HIV. The duo advertised a 'first-time-ever' event at an international AIDS conference: a 'TB/HIV networking zone' with a plenteous programme of speakers, studies, and events, all dedicated to the ever more pressing phenomenon of co-infection.

The comical representation of the two pathogens exemplifies the common strategy of ridiculing the causal agent of a disease in order to empower those who oppose it. This spectacle of two personified pathogens worked, also, as recognition of the distinctiveness of each disease. While TB/HIV has much been campaigned upon, and while different protagonists and institutions have worked hard to introduce this #deadlyduo into global health's repertoire of action, TB and HIV never ceased to be two separate entities. Much work was needed to bring them together into one frame of reference, so that they could circulate on Twitter and elsewhere together.

Already in the late 1980s, papers were being published that not only argued for the inclusion of TB on the list of AIDS index diseases but that also pointed to the changing biology of TB in cases of HIV, and thus to the drastic increase of complexity when dealing with patients who manifest both diseases (Nambuya et al. 1988). Since the emergence of a significant number of TB cases in people with HIV during the last two decades, the infection of one person with TB and HIV simultaneously has been called a broad variety of names. The earliest official WHO papers reported a 'deadly partnership' (WHO Global Tuberculosis Programme and UNAIDS 1996), while in more recent publications, TB/HIV co-infection has been referred to as a 'perfect storm' (Yoon 2007) and a 'deadly liaison' (Kaufmann and Walker 2009). A special issue of the *Journal for Infectious Diseases* framed it as 'synergistic pandemics' (Mayer and Dukes Hamilton 2010), while others conceptualised it as 'double suffering' (Vidal and Kuaban 2011) or 'double stigma' (Daftary 2012). In 2007, 1.37 million people infected with HIV were estimated to be co-infected with TB, and one in four deaths from TB was related to HIV (Getahun et al. 2010). These numbers illustrate the severity of TB/HIV co-infection as a public health threat; our interest is in how it has become increasingly 'branded' (Ogden, Walt, and Lush 2003) as a unique problem in need of independent political and financial means at the beginning of the new millennium. The combined acronym of TB/HIV has thus turned into a distinguishable and common 'brand'

in the field of global health, much like related treatment approaches including DOTS, HAART, PreP, or TasP, and the attempt to combine them (Farmer et al. 2001).[1]

The addition of syndemics

Yet does one plus one really equal two? Are TB and HIV taken together 'just' a deadly duo? The coappearance of both diseases in patients indeed leads to an added level of complexity, oftentimes framed as a 'syndemic' (Singer 1996), yielding new questions, problems, and challenges for the clinic and public health. The objective of a syndemics approach is to acknowledge co-occurring epidemics as fundamentally entangled and structured by similar epidemiological conditions of poverty, inequality, and discrimination, all adding up to states of bad health (Singer et al. 2006). Syndemics research thus focuses on those 'communities experiencing co-occurring epidemics that *additively* increase negative health consequences' (Singer 2009, 12). In other words, co-infections like TB/HIV but also epidemics like drug addiction and hepatitis 'add up', becoming even more severe, multiplying their disastrous health consequences. Within a concept of syndemics, co-infections are thus framed as multiplied deadly afflictions, which constitute first and foremost a deadly phenomenon, as well as an intriguing practical problem in the clinic and in public health, determined by structural factors. In the syndemics literature, it is argued that these structural factors not only add up to bad health, but also multiply the vectors of overall disease burden (Singer 2009, 21). The 'inability to take into account biological, social, and political issues of co-infection' (Taylor and Harper 2014, 199) is held responsible for the ravages of syndemics, and it is in this field that public health policies and treatment and prevention programmes need to be improved. In the end, the concept of syndemics shows how single-disease approaches that do not take into account structural inequalities constantly fail. Its proponents usually make a prescriptive argument that such inequalities should be addressed in conjunction with each other, taking into account the multiplied complexity for treatment and prevention in dire socioeconomic conditions when more than one epidemic occurs at a time.

Proposing syndemics as a way to conceive of the practical and structural problems co-infections create does not, however, seem entirely satisfactory to us, as it does not

[1] These acronyms translate to: Directly Observed Treatment–Short Course (DOTS), Highly Active Antiretroviral Therapy (HAART), Pre-exposure Prophylaxis (PreP), and Treatment as Prevention (TasP).

fundamentally question the single-disease framework and its associated ways of research. We therefore suggest taking TB/HIV not only as a practical problem but also as a heuristic lens, as an analytic lever, so to speak. Instead of only creating problems, TB/HIV can also open up new ways to rewrite and rethink the histories and presents of TB and HIV, as well as the general phenomenon of co-infection: entanglement. We argue that as a new, combined entity, TB/HIV permits not only a fresh look at each disease's field of knowledge and practice, but also epistemological questions on how to know and see infectious diseases. We suggest, with this perspective, that one plus one does not equal two: co-infections are more than deadly duos, they are more than complex syndemics. They are intriguing 'epistemological obstacles' (Bachelard 2002) – not only for medical and public health practice, but also for the social sciences and humanities.

We understand epistemological obstacles to be productive: they challenge established ways of seeing and dealing with disease, and allow us to investigate new avenues for different kinds of research on epidemics. Seeing diseases as co-infections allows us to think and analyse beyond the given narratives of specific diseases, and draws our attention to common problems, shared underlying conditions, and the ways in which strategies and concepts, which have been developed to tackle one disease, travel on to another. Conferences, archives, library sections, reading lists, series and collections, and book chapters and articles regularly follow disease 'biographies'. It thus takes a great deal of intellectual effort and creativity to bridge their histories, to relate them; to find concepts, practices, and ideas in the in-between of two diseases; and to follow how one disease informs the ways in which another disease is approached. Some work has already be done to show how epidemics simultaneously reveal and veil each other, most recently by Julie Livingston (2012), who shows the interrelations between AIDS and cancer in Botswana, and by Johanna Crane (2011), who links the conceptualisation of treatment resistance in the field of HIV to the problematisation of multiresistant tuberculosis. Even as we write this, other co-infections like AIDS and hepatitis C are becoming new grounds of research and funding (see, for example, Chabrol 2014c).

As researchers in the field of anthropology and the history of infectious diseases, we wish to slightly step back from the dire reality of multiplied disease loads, and instead interrogate the historical conditions in which co-infections became problems of health politics and policies in the first place. By shedding light on the processes through which TB/HIV co-infection came to figure as a productive concept, we aim to foreground issues of clinical complexity, lack of funding, pharmaceutical development, and advocacy in the field of global public health. Our argument – that thinking with 'co-infection' challenges our idea of disease entities – is therefore informed by a historical anthropology of sorts, rather than ethnographic material collected through interactions with health professionals on the ground or global health actors and institutions. While this is a preliminary investigation of the global

health and medicine policy documents that shaped the discourse on co-infection in the late 1990s and early 2000s, our larger epistemological argument suggests ways in which historical and ethnographic research on diseases of co-infection might be conceptualised in the future.

TB/HIV as an epistemological obstacle

TB/HIV is a paradigmatic example of the insufficiency and inadequacy – and yet solidity – of singular clinical, epidemiological, and other classification systems, which are made to separate and to distinguish phenomena. These systems are designed to order complexities, rather than perceive them. We take TB/HIV as a synecdoche, a case that exemplifies the fundamental questions that arise when dealing with the parallel and entangled occurrence of multiple diseases at the same time, where one disease veils and simultaneously reveals the other (Livingston 2012). As recent studies on hepatitis C and HIV (Greub et al. 2000; Chabrol 2014c) show, pathologies manifest differently once their entanglement ceases to be masked by the divisions – diagnostic procedures, economic interests, research opportunities, and political urgency – of the medical and scientific field. As such, co-infections pose challenges to treatment guidelines, clinical protocols, randomised trials, epidemiological models, and practices of care – as well as the epistemological premises of writing and thinking about diseases in the social sciences and humanities. That is why we understand TB/HIV as an epistemological obstacle in the productive sense. As an entangled phenomenon, TB/HIV produces continuous and shifting states of complexity, which are due to the distinct histories and presents of TB and HIV, but which can never fully be referred to by them nor be explained by them alone. TB/HIV thus constitutes a new entity for public health while at the same time being entrapped in two already-existing disease histories, which have to be rewritten for the future. In TB/HIV, we thus see co-infection as a process that both dissolves and stabilises two of the major infectious diseases in global health.

To better grasp this parallel process we turn to Ludwik Fleck's (1981) seminal work on the genesis of a scientific fact. Fleck (1981, 109) used the term 'translation' to describe the process of two thought collectives talking to each other: 'Collectives, if real communication exists between them, will exhibit shared traits independent of the uniqueness of any particular collective'. Building on Fleck's description of how the concept of syphilis passed from one thought community to another, we see translation in the context of TB/HIV as the following: the entanglement of TB and HIV can be understood as the passage of one thought community and disease concept *through* the other. We take from Fleck the observation that if an entangled object made of different collectives appears, there ought to

be a common ground in both diseases that permits the entangling of the object in the first place. Thus, co-infection allows us to interrogate the pasts and presents of diseases for their common ground and shared traits. Such features might contest the uniqueness and specificity of both TB and HIV/AIDS; they might also reveal that treatment and prevention of TB and HIV continue to be largely structured by a modern understanding of infectious diseases as caused by discrete microbiological agents, best solved through pharmaceutical treatment, and always entangled in the social, political, and cultural webs that make up societies in history.

If translation is successful, and communication takes place, then transformation is inevitable. Fleck (1981, 111) continues: 'Communication never occurs without a transformation, and indeed always involves a stylised remodeling, which intracollectively achieves corroboration and which intercollectively yields fundamental alteration'. The crucial point here for the case of TB/HIV co-infection is: when the thought collectives of TB and HIV communicate, they are always already transforming their ideas and concepts of the diseases at stake. This means that the concepts a) gain strength and significance within the existing collectives, and simultaneously b) become altered in between the thought collectives. For Fleck, this doubled process of alteration and corroboration is the basis for an epistemological approach to the genesis and development of any knowledge.

Our brief evaluation of both diseases in their own spheres, and of efforts to address their short entangled history, reveals both the sturdiness of certain aspects of each disease as well as the fluidity and contingency of the very same cultural, social, and biological elements involved in their making. While the lens of co-infection might partly dissolve the existence of single-disease concepts in medicine and public health, their practical use endures, solidly anchored. Given the endurance of single-disease concepts, we begin in the next section by engaging with the histories and presents of TB and HIV. Following that discussion, we trace the features of each disease that get invoked in relation to the phenomenon of TB/HIV co-infection, as found in public health publications and WHO reports from the early 1990s through the present. We then use this analysis as a tool to open up new research questions and to propose strategic entry points for future ethnographic and historical research in this emergent field of histories and anthropologies of co-infection.

Single diseases

In his classic work on the history of nosography – the systematic description of diseases – Knut Faber (1930, 7) states that the clinician 'cannot live, cannot speak or act without the concept of morbid categories'. The idea of morbid categories, or single-disease concepts, is

of course older and can easily be traced back to Hippocrates and beyond – if it is understood as a set of abstract signs that describe disease, used to organise diagnostics, treatment, and surveillance. The single-disease concept became fundamental to medicine (and the history of medicine and anthropology) at the beginning of the nineteenth century, with the birth of modern medicine and its empirical lab procedures and scientific principles of proof. Elaborating on this claim, Charles Rosenberg (2002, 237) argues that a 'modern history of diagnosis is inextricably related to disease specificity, to the notion that diseases can and should be thought of as entities existing outside the unique manifestations of illness in particular men and women. During the past century especially, diagnosis, prognosis, and treatment have been linked ever more tightly to specific, agreed-upon disease categories, in both concept and everyday practice'.

The phenomena of co-infection would thus seem difficult to accommodate into modern medicine's etiological theories and its way of seeing disease as singular, or perhaps additive at best. But neither do single diseases, however, easily come into clinical existence as such. It is precisely in the histories of TB and HIV, and their respective stabilisation as single diseases with a characteristic scientific, clinical, social, and cultural profile, that one can begin to understand the emergence of TB/HIV as additive conceptual entity, one that engenders practical problems, and the reasons for the difficulties in treating or researching both diseases as a lived entanglement.

TB

In Europe and North America in the nineteenth and early twentieth centuries, TB was the 'number one cause of death' (Packard 1989, 1). Known as the 'white plague', it triggered bacteriological and medical research of unprecedented kind (Gradmann 2005), which resulted in the creation of a strong tuberculosis research, practice, and policy community at the intersection of science, medicine, and society. It is thus not accidental that, in medical history accounts, tuberculosis figures as the paradigmatic disease of early biomedicine of the 1940s and 1950s, when the relations between the laboratory, the clinic, and the pharmaceutical industry were reconfigured (Quirke and Gaudillière 2008).

Since then, the TB community has become international in scope, consisting of national and international medical associations like the International Union of Tuberculosis and Lung Disease, bacteriological reference laboratories, vertical disease-control programmes (see Harper 2006), and medical institutions like dispensaries and treatment centres across the world. At the European level, nationalised public health strategies include screening (see

Armstrong 2012; Welshman and Bashford 2006), contact tracing (see Kehr 2012a), and isolation (see Strange and Bashford 2003). Worldwide, the WHO's Directly Observed Treatment Short-Course strategy (DOTS) dominates TB control, especially in the Global South. TB has always disproportionately affected poor, disadvantaged, and dominated populations. It thus exemplifies the complex relationship between social inequalities, biological processes, biomedical research, and the unequal development of disease in different groups of people, making it a truly biosocial phenomenon. Anthropologist Erin Koch (2013a, 309) has recently argued that TB can be seen as a 'threshold where social and biological aspects of disease are negotiated'. TB is therefore an interesting object for the social history of medicine (Amrith 2004; Barnes 1995; Bryder 1988; Condrau and Worboys 2010; Packard 1989), critical medical anthropology (Draus 2004; Farmer 2000; Kehr 2012b; Keshavjee 2014; Koch 2013b), and social epidemiology (Gandy and Zumla 2003), fields of research that we also see as part of the TB community. TB is, in other words, a vantage point from which both the history and the present of complex interrelations between disease, medicine, and society can be examined.

Yet compared to the large amount of scholarship generated in the field of HIV/AIDS, in the social as well as medical sciences, the body of work taking TB as a primary object of research is almost ridiculously small, and so is the TB community. Why is this so? One reason is that TB began to disappear as a major public health problem in Europe and North America in the 1960s, which led to considerable neglect of this disease during the 1970s and 1980s in the international arena and in research (Ogden et al. 2003, 180). TB, at least in the North, had become 'manageable' in the 1960s with the advent of antibiotic combination therapy. Long sanatorium stays and yearlong treatments were transformed into short-term relations between patients and health professionals, mediated through the mostly technical administration of drugs. Additionally, economic and social developments like universal access to health care, social insurance, improved living conditions, and a decrease in poverty in the postwar years proliferated in the North. The de facto availability of treatment coupled with these welfare advances thereby effectively contributed to declining TB disease rates in Europe and North America. TB thus became less and less visible in Northern societies, as prevention campaigns and mass-screening measures, such as mobile X-ray vans, gradually ceased to operate. The epidemiological decrease in disease rates in the North was paralleled by a strong belief in ever-advancing modernisation and development in the 1960s on a global scale, which helped make TB invisible as a public health problem. In sum, biomedical science gradually stopped basing its future on old diseases like tuberculosis, turning instead to new, scientifically more interesting, and more profitable challenges (Kehr 2012b).

In the South, though, among the newly independent nations, tuberculosis did not disappear as a major public health problem. When the incidence of multiresistant tuberculosis began to peak among poor people in New York and London, and when immigrants from the South

began to be seen as a new threat to the North in a 'regime' of global health that Andrew Lakoff (2010) has recently called 'global health security', the disease began to receive renewed interest from the public health scene – from funders, to scientists, to humanitarian organisations, to disease control programmes. Though described as the 'return' (Gandy and Zumla 2003) of tuberculosis, this was in fact rather a renewed visibility of TB on a global scale, a second modernity of a disease long ignored.

Just a little more than a decade ago, TB as a site of research and action began to be invested in again, with the creation of such powerful organisations as the Global Fund and the TB Alliance. Not incidentally, renewed interest in TB has emerged alongside the massive advent of HIV/AIDS in an ever-more interconnected world and in the nascent field of global health, even if the power balance between TB and HIV/AIDS remains tilted. In 2012, the Treatment Action Group observed a total spending of $US627.4 million on TB research and development (Frick and Jiménez-Levi 2013, 1) while spending for HIV research and development totalled $US2.6 billion (Smelyanskaya and Treatment Action Group 2013, 1). One could provocatively hypothesise that HIV created a new window of opportunity – not only for deadly co-infections to prosper, but also for the TB community to reactivate and reconstitute itself. What role HIV/AIDS played in the reactivation of TB research remains an open question. What we do know is that in the mid-1990s and early 2000s, new research and funding for this long-neglected disease was revived on a global scale: the DOTS strategy gave new visibility to TB in the 1990s in the midst of the emerging AIDS crisis; interest in the development of new TB drugs grew in the 2000s, not only due to bacterial resistance to existing drugs but also due to a need for better compatibility with antiretroviral combination therapy; novel institutions like the Global Fund for AIDS, Malaria and TB were created; and – last but not least – the TB/HIV strategic framework, elaborated by a working group hosted by the Stop TB department of the WHO, came into existence (WHO Stop TB Initiative 2002).

HIV/AIDS

In stark contrast to the long history of TB with its ups and downs over the past one hundred years, AIDS is a rather young disease. AIDS is not a disease in itself but is understood to be a syndrome of immune deficiency, which disposes a person to contract or develop a number of known diseases. In many ways AIDS can be understood as the paradigmatic disease of co-infection, born out of an assemblage of many known diseases that appear in unusual circumstances and strange habitats. AIDS in itself is always already manifested through the emergence and visibility of other diseases like Kaposi's sarcoma (KS) or pneumocystis

pneumonia (PCP) (Preda 2005). By working through the unusual displacement of KS and PCP on bodies of young, mostly homosexual, men in the late 1970s, a new clinical picture emerged in which KS and PCP, in connection with a series of other infections, became resignified as symptoms of a new syndrome (Harden and Fauci 2012).

The history of AIDS remains inextricably bound to the early years of the disease, in which the homosexual male body served as a vessel assembling the many unusual and not understandable signs of a new epidemic, establishing a strange relationship between the disease and some 'aspects of a homosexual lifestyle' (CDC 1981). The rather technical process of re-arranging and re-establishing abstract entities of a disease was accompanied by a series of accusations in which homosexual lifestyle became a crucial part of the endeavour to classify AIDS, which had been previously and informally called 'Wrath of God Syndrome' (WOGS), and was also briefly classified as 'Gay-related Immune Deficiency Syndrome' (GRIDS) (Treichler 1988, 52). Paula Treichler famously coined the term 'epidemic of signification' for the endless chain of meanings that got attached to the new and, in the beginning, inexplicable disease – obsessively cycling around the trope of the homosexual man (Bersani 1988; Crimp 1988; Watney 1987; Yingling 1997).

By 1983 the US-based Centers for Disease Control had classified the new syndrome as an infectious disease with an unknown transmissible agent. They described the probable modes of transmission and characterised the syndrome through four prevalent risk groups: homosexuals, heroin users, haemophiliacs, and Haitians, the infamous '4-H' (Brandt and Jones 2000). A list of infectious diseases that likely occur in cases of AIDS was defined and predominantly used for diagnostics and screening, as blood testing only became available in 1985 (Farthing 1988).

The identification of the virus is in itself a story of scientific obstacles and transnational politics (Epstein 1996). At one point in 1985, not less than six candidates had been identified as the virus responsible for AIDS. Immense political pressure and mostly pragmatic reasons led to the publication of an article in *Science*, where the various models and candidates were merged into the well-known acronym 'HIV' (Coffin et al. 1986).

But the classification of the disease was also achieved through other practices, including the geographical mappings of its origins (Crane 2011; Gallo 1987; Fassin 2007; Pepin 2011; Shannon and Pyle 1989), public health interventions (Bordowitz 2010; Crimp and Rolston 1990; Cooter and Stein 2007), and, especially, social activism. The unprecedented history of ACT UP, and many more community-based practices of protest and resistance to governmental neglect and public hysteria, shifted conceptions of global health, the relationships between doctors and patients, and the relationships between the state and

recipients of health services (Aggleton, Davies, and Graham 1997; Crimp 2003; Patton 2002).

With the acceptance of the viral agent HIV, AIDS became a stabilised and defined disease entity. The identification of the virus is often presented as a key moment in the history of AIDS, which led to the historically unprecedented development of scientific research and its immense funding (Oppenheimer 1988; Fee and Fox 1992). But identifying the virus also permitted the carving out of homosexuality as the initially identified causal factor for the disease. In this way, HIV served as yet another vessel to remove both public and scientific attention from social arguments, placing them instead inside the laboratory and its microbiological possibilities of intervention (Engelmann 2012).

With the establishment of antiretroviral therapies (ARVs) in the mid-1990s, the image of AIDS was transformed, and its characteristic habitat was shifted from the urban centres of Northern Europe and the United States to the rural landscape of sub-Saharan Africa. Again, the very identity and structure of AIDS, or its nature, one might say, was transformed and reinvented. 'African AIDS' became a disease of the poor, predominantly heterosexual and mostly ignored throughout the rest of the world (Packard and Epstein 1991). Framed as 'Pattern 2' (Patton 2002), and shrouded under a global anaesthesia (Fassin 2007), the pandemic thrived in some countries. It was only when ARVs became available – though not equally accessible – in the early years of the twenty-first century, that the issue of distribution and health equity once again dominated the epidemic. The Treatment Action Group (TAG) and other activist organisations fought the cynical system of pharmaceutical patents, achieving the removal of trade regulations for generic ARVs in most of the highly affected countries.

Today, the early 1980s can be understood as an archived history of AIDS. Through numerous practices like safe sex, educational campaigns, and the distribution of condoms; through blood testing and treatment plans; but also through visual representations, the messy and seemingly boundary-less phenomenon of a threatening pandemic was transformed into a rather fixed entity of knowledge, attached to the clear and almost incontestable aetiology of HIV. In short: the history of AIDS demonstrates how biomedicine, public health, and biosocial communities worked very hard – often with each other despite their many differences and open conflicts – to achieve the specificity of AIDS, often but not exclusively bound to the infectious agent, HIV.

Bringing TB and HIV into conversation

We have shown that since the 1950s TB has been a curable disease, engendering short-term relations between sometimes highly infectious patients and health professionals through the mostly technical administration of drugs, while HIV remains incurable. Yet HIV has been largely normalised into a chronic disease through social and political change, the pharmaceutical intervention of ARVs, and long-term care relationships that are regularly accompanied by the formation of self-help groups and political activism. While tuberculosis is just recovering from its long neglect as a disease 'without a future' (Kehr 2012b), ever since its emergence as a serious global health threat in the 1990s, HIV has been a popular focal point for global health actions and funding worldwide. Death rates in the AIDS epidemic significantly declined after the distribution of ARVs became an essential cornerstone of global health endeavours. In contrast, TB has again become deadly through multiresistant and ultraresistant bacteria, and the TB community continues to struggle for funding and recognition.

Disease surveillance, treatment programmes, prevention activities, and funding streams have largely operated separately for HIV and TB, thus reflecting distinct, if not incommensurable, disease identities, histories, and research communities. The geographies of disease are not quite the same, even if both diseases followed a similar path of 'tropicalization' (Rees 2014, 240). Nor do the cultural histories neatly map onto each other. While TB is still framed in terms of old age, low tech, and little potential for innovation, HIV/AIDS has long attracted state-of-the-art research, rapid change, and significant activism. Given these different scientific, historical, and cultural trajectories, how then can TB/HIV be jointly addressed by global public health efforts? When policies, guidelines, and recommendations are established to address co-infections in a collaborative manner, what are the problems that emerge?

To analyse this double process of historical distinction and contemporary entanglement, Fleck's (1981) work on thought styles, thought communities, and translation is again useful. While Fleck followed how syphilis was made into a disease entity, tracing different thought styles that bridged clinical practice and the bacteriological laboratory, we seek to understand the entanglement of two diseases. As we noted earlier, Fleck used the term 'translation' to describe and understand the events that unfold when two thought collectives collaborate and communicate with each other. Applying this concept to the case of TB/HIV, two disease collectives brought together through the practical entanglement of two diseases in patient bodies, one can very well see the doubled process of corroboration and alteration described by Fleck in the case of syphilis. TB/HIV, as we will show below, is as much a new disease entity – merging and emerging out of the field of already-known entities – as it is a process in which both diseases are stabilised.

Twenty years of TB/HIV co-infection

Since the 1990s, there have been numerous efforts to bring together the 'disease cultures' and treatment approaches of TB and HIV, and attempts to raise awareness of co-infections on the epidemiological, clinical, and political levels. A few years before the WHO established an active protocol on TB/HIV co-infection, the CDC (1991) published the first official report on the phenomenon. Based on studies in the USA, for example on male inmates in state penitentiaries (Salive, Vlahov, and Brewer 1990), or on the TB prevalence in certain districts of New York City (Fairchild and Oppenheimer 1998), HIV was identified as a crucial factor for an elevated risk of TB infection. These studies showed that HIV was driving the increase in TB infections, an unprecedented finding in a setting where TB was long seen as overcome. In parallel to the geographical trajectory of both epidemics, the centre of gravity for co-infections shifted from the United States and Europe to the territories of the so-called developing world, engaging old and new actors of global health. As a result, by the early 1990s, the WHO and the World Bank had already developed strategies to 'revitalize the global efforts against tuberculosis' (Broekmans 1991). In 2004, the WHO issued its first comprehensive Interim Policy on Collaborative TB/HIV Activities to 'assist policy-makers to understand what should be done to decrease the joint burden of tuberculosis and HIV', responding to a 'demand from countries for immediate guidance on which collaborative TB/HIV activities to implement'. The WHO's TB/HIV policy is thus a practical response to the emergence of TB/HIV co-infection in the nascent field of global public health (WHO and Department of HIV/AIDS 2004, 1). But how was TB/HIV conceived of and responded to in the very first years?

Assembling a combined effort: WHO reports on TB/HIV co-infection

The earliest documents on TB/HIV circulated in the WHO were two articles summarizing the clinical features, diagnosis, and treatment (Raviglione, Narain, and Kochi 1992), and the epidemiology and strategies of prevention (Narain et al. 1992). Both papers were written from the perspective of the WHO Tuberculosis Programme, and both aim to survey the challenges posed by co-infection for global health professionals working on TB in the Global South. A technical guide, published in 1993 (PAHO 1993) and an early, unpublished document from the WHO follow the same trajectory: they focus on the 'implications for TB control'. The latter is marked as a report based on a loose collaboration of the WHO TB Programme and the Global Programme on AIDS, who developed the paper 'to summarize the current state of knowledge about how best to deal with TB in circumstances where HIV is prevalent or emerging' (WHO Tuberculosis Programme 1994, 1).

The early years of the co-epidemic of TB/HIV were thus formed and structured by protagonists from the field of TB, rather than HIV. This could be attributed to the 'attraction' (Chabrol 2014a) that the rising field of HIV prevention and research triggered, a field far more lucrative than any other global infectious disease programme. Yet the increasing mobilisation of the TB community on issues of co-infection might also be read as a strategy in which the emergence of a new entity – TB/HIV – was used to re-establish the global focus on TB, at that time a neglected and underfunded disease. The WHO report of 1994 paints a drastic picture of both epidemics, estimating that the 1990s would see ninety million new cases of TB, with about thirty million deaths, and thirty to forty million new cases of HIV, with about ten million deaths. Co-infections were anticipated to increase within the decade from around 300,000 in 1990 to around 1.4 million by 2000. And, indeed, co-infections peaked in 2004 at 1.39 million and roughly 550,000 deaths (Getahun et al. 2010).

In sum, sombre scenarios of a growing public health threat with high rates of mortality were literally figured up through epidemiological visions of the deadly nature of co-infection, contributing to a sense of immediate urgency. As Craig Calhoun (2004) has shown, the conjuring of such states of emergency and urgency never stand alone but are always followed by calls for intervention, which was also the case in the field of TB/HIV. The WHO report concludes by pointing to the urgent need for increased funding, staff, and resources in the already existing structures of TB prevention and treatment. Co-infection was said to be effectively containable by making TB visible again and by tackling its underfunded status. As such, the 'neglect and the allocation of resources to other health needs' should be addressed (WHO Tuberculosis Programme 1994, 10). Even more so, the co-occurrence of TB and HIV should be used to identify those places and institutions where TB guidelines were not or only partially followed: 'Any TB program's weaknesses are exposed where HIV is prevalent and are indicated by increases in TB cases and mortality' (WHO Tuberculosis Programme 1994, 23). In sum, since its beginnings, TB/HIV was not only seen as a novel practical problem, but also as an occasion to reflect on the cultural status, treatment approaches, institutional structures, and funding mechanisms of both diseases, and especially those of TB.

Another consistent feature throughout comparable documents is the urgent call to apply standardised diagnostic procedures, which are said to be especially lacking in the domain of TB: 'Providing trials of anti-TB drugs to patients to see if their health improves has sometimes been attempted to obviate the need for diagnosis. TB treatment is sometimes started solely on the basis of clinical symptoms. … [I]ndeed, in most places TB aspects of health services had been so neglected that these crucial elements were weak or non-existent prior to HIV's entry into the picture' (WHO Tuberculosis Programme 1994, 7). The appearance of HIV within TB's control and treatment structures therefore re-establishes

routines, 'rejuvenating' protocols and rationalities originally invented to tackle TB. TB/HIV not only complicates the treatment of each disease, but also works as a matrix through which practical problems on the ground come to the fore. The entering of HIV into TB's field of practice and problematisation works as a diagnostics of insufficiency, showing its failures, inconsistencies, and incompleteness, yet also confirming TB as a distinct disease entity with its own structures of control.

Finally such early reports set out an 'agenda for collaboration' between TB programmes and AIDS programmes. A well-functioning national TB programme, built along the lines of the WHO guidelines, will be able to collaborate on all necessary levels with AIDS programmes, so goes the argument. A TB programme that cannot accomplish the basic task of achieving a comparably high cure rate, though, will not. These early reports on TB/HIV co-infection are written against the frightening backdrop of spiking AIDS rates worldwide, at a time when HAART was not established yet, but DOTS was increasingly being adopted.

The proceedings of a workshop, held in May 1995, gives a detailed account of the problems at hand. The workshop was organised by the WHO's Global TB Programme and was intended to result in a new research strategy on TB/HIV co-infection. The main goals were to improve TB control in areas of growing AIDS and HIV prevalence; this was to be achieved by the shared involvement of groups, communities, experts, and researchers from the long-standing TB Programme and the newly constituted UNAIDS Programme (WHO Global Tuberculosis Programme 1995). At the time, TB was understood as one of the most common opportunistic infections during the development of AIDS, and thus seen as the leading killer of patients with AIDS. This particular situation of urgency challenged health professionals to develop new settings for care, complementary to the clinic, for example, in private homes. In the workshop's report, co-infection is presented as a unique chance to improve the distribution of care costs, a growing burden due to the dramatic increase in AIDS cases, to fields outside of infectious disease wards, providing an opportunity to investigate the feasibility and effectiveness of such strategies in the case of TB (WHO Global Tuberculosis Programme 1995). In the absence of a pharmaceutical solution, the control of TB in HIV-infected patients was thus seen as having great potential. Once TB was acknowledged as a major cause of death for AIDS patients, its treatment was also seen as a possible avenue for action. While the entering of AIDS into the field of TB conjured a diagnostics of insufficiency and the possibility of increased funding, the entering of TB into the field of HIV/AIDS led to a demand for collaboration and 'mutualisation', which held TB treatment communities responsible for successes and failures.

Almost ten years after the early reports, and despite the introduction of ARVs into the domain of HIV treatment and prevention, many of the problems already documented in the

1990s seemed to persist. The strategic framework on TB/HIV co-infection, the WHO's Stop TB Initiative (2002), which served as the basis for the WHO's Interim Policy on TB/HIV, again criticised the one-sided focus on highly specialised and often elitist HIV clinics as the only possible place to fight both epidemics. The document suggested pursuing a more general health-care approach, in which the entanglement of both diseases and their two-way ramifications could be better acknowledged, instead of further specializing in the treatment and control of single diseases: 'Tackling HIV should include tackling tuberculosis as a major killer of [people living with HIV]; tackling tuberculosis should include tackling HIV as the most potent force driving the tuberculosis epidemic' (WHO Stop TB Initiative 2002, 17). Another WHO workshop report on TB/HIV ('Two Diseases – One Patient'), this time held in Addis Ababa in September 2004, which was convened by the Stop TB Partnership, describes the many gaps between the competing and often conflicting cultures, histories, and infrastructures of TB and HIV treatment communities: 'The different histories and cultures of the TB and HIV communities raise many challenges in achieving an effective and productive partnership' (WHO 2004, 2–3).

While HAART had become a major 'game changer' in the AIDS crisis, not much else had changed in the field of TB. The practical difficulties of cooperation are paramount in the reports. Bringing the TB and HIV communities – with their respective loci of care, treatment approaches, and funding schemes – together was indeed seen as a major precondition for collaboration. Thinking, preventing, diagnosing, and treating HIV/AIDS, in other words, must take into account the possibility of TB co-infection, and vice versa. The strategic frameworks suggest that the coupling of TB and HIV treatment and prevention activities would not only increase funds to deliver sufficient treatment for TB, but also that the new framing of HIV through TB co-infection would help raise awareness about inequality issues among health professionals working in well-equipped HIV institutions. It is precisely in this space between specialised, rather well-off HIV clinics and notoriously underfunded general health delivery systems or disease wards (Chabrol 2014b; Livingston 2012) that TB/HIV co-infection becomes a key issue at the beginning of the twenty-first century. Another recent report by the international partnership ACTION (2009, 7) underlines this connection: 'it has become crystal clear that effective HIV/AIDS programs must address TB as the disease most likely to kill people living with HIV. Despite a wealth of evidence and clear guidance, however, a concerted, integrated response to the co-epidemic has yet to coalesce: in 2007, WHO estimates that worldwide only 2 percent of people with HIV were screened for TB'.

Looking chronologically at these developments, we can see a turning point in how TB/HIV co-infection is problematised in the early 2000s, notably when the issue of cooperation becomes more and more focused on questions of treatment, especially in the Global South. The slogan 'Living with HIV, dying of TB' marks the cruel reality of suffering from

potentially deadly TB disease while controlling one's HIV infection through ARVs. Often framed as a chronic shortage of resources for the treatment and identification of TB, the phenomenon of co-infection thus helped to reveal the practical importance of the different cultures of care, regimens of intervention, and politics of treatment in which both diseases were constituted and are contained. A critical analysis of the increasing convergence of health programmes and community efforts in the domain of TB/HIV since 2004 had to acknowledge again and again the vast imbalance between a powerful global scene of AIDS research activities and activism and the 'weak advocacy and anaemic research funding' for TB (Harrington 2010).

This situation continues to affect the ways each disease is approached, and, as a consequence, the impossibilities of cooperation and convergence. In 2009, reports on TB/HIV co-infection became increasingly alarming. They started to openly criticise the big donors of global health like the Bill & Melinda Gates Foundation and the Global Fund for having long ignored the burden of TB/HIV co-infection. Donors were specifically accused of having failed to implement almost all of the WHO policies developed since 2004, and of having continuously insisted on the reproduction of existing funding schemes along the lines of single-disease concepts (ACTION 2009, 4).

This short survey of WHO policy reports and working group documents shows that the entanglement of TB/HIV remains a hotly debated issue with no easy solutions in terms of treatment and prevention, despite the many 'shoulds' and 'woulds'. Despite a twenty-year effort to raise awareness of co-infection, and despite the overwhelming evidence that TB is – in principle – a treatable and curable disease even when a co-infection with HIV occurs, TB remains the number one killer of people living with AIDS and HIV (Getahun et al. 2010). Yet it is also clear that despite the many policies and advocacy efforts, TB and HIV are still largely conceived of and managed as two distinct disease entities, associated with distinct treatment trajectories, different care practices, and unique politics of public health.

Our article does not aim to resolve this ongoing problem of public health systems around the world when co-infections occur. Nor does it point towards possible answers to the complicated questions of collaboration between two historically and biologically different diseases and their treatment and research communities. Instead, we aim to open up a field of inquiry and pose new questions in relation to TB/HIV co-infection, to go beyond a concept of co-infection as the complex and problematic sum of two diseases. We also aim to go beyond diagnostics of insufficiency, which result in largely prescriptive policies of disease control, often written in the conditional tense. Rather, by demonstrating the persistence of single-disease concepts alongside the emergence of TB/HIV co-infection, we want to ask

how TB/HIV as a merged entity alters and stabilises each disease at the same time, and then open up some propositions for future research.

Beyond addition, towards alteration: TB/HIV as heuristic lens

The reports and publications above share two very general ambitions. First, all of the authors and institutions involved wish to create awareness of a new entity, one that is relevant to public health policy making, scientific research, and medical practice. Second, this endeavour is accompanied by various efforts to bring two very different disease communities in touch with each other, and to establish both an understanding as well as a strong sense of mutual dependency. These parallel processes are paradoxical: the creation and stabilisation of a new entity is used to challenge the notion of single diseases and their communities as much as it is used to highlight the features, benefits, and structural problems of each disease community. While TB/HIV is crafted to become a focal point of politics, funding, and medical intervention, neither TB nor HIV is dissolved as an independent entity. On the contrary, the published reports often point to the mutual benefits of collaboration for the treatment and prevention of each disease in their own respective fields. Adding together two diseases does not simply lead to a new amalgamated version, in which the old diseases dissolve and a new entity appears. Co-infection as a phenomenon challenges the way we think about single diseases as distinguishable entities, as its appearance also stabilises each disease as a distinct and specific entity, reinscribing differences rather than collapsing them.

On the one hand, TB/HIV and its associated practical problems figure as a constant reminder to health professionals of the historically dense local specificities of and national differences between treatment and prevention programmes, and also the neglected issues of inequality and poverty worldwide. TB/HIV as a new entity thus conjures once again, with force, the figure of the complex patient and her lived experience, a figure that always already evades abstract politics, solutions, and concepts, dreamed up in big institutions, scientific laboratories, and global economies. Co-infection thus grounds public health professionals in their efforts of introducing programmatic changes or implementing guidelines and procedures, because it works as a constant reminder that implementation is rarely a problem of implementation alone, but more typically one of adaptation, translation, and reconfiguration. It is no accident that Farmer and colleagues (2013) introduce their recently published introduction to the edited volume *Reimagining Global Health* with a detailed description of a young man, living in a sub-Saharan village, suffering badly from both HIV and TB. The figure of the suffering patient vividly illustrates that the global health project continues to fail to address the intricate complexities of treatment and prevention as they

take place in real-life circumstances, shaped by conditions of poverty, inequality, and colonial history.

On the other hand, the very failure of addressing TB/HIV properly as a new, amalgamated phenomenon, as was argued in ACTION's 2009 critique of major global donors, shows the persistency of TB and HIV as established categories of single diseases with their own trajectories, communities, and assigned professionals and programmes. Invoking the need for communication and coordination both references the difference between TB and HIV and paradoxically stabilises each, in so much as each is re-essentialised. So while we have pointed out numerous ways in which AIDS and TB came to be stabilised, and to a certain extent normalised, entities in the realm of global public health, we argue that co-infection might also be understood as an additional factor, one that simultaneously challenges the single-disease concept as much as it solidifies its very nature.

Revised against the background of medical history, the thoughts of George Canguilhem (1978) might prove helpful to better understand what is at stake here. The specificity of the single disease proves desirable again and again in the realm of medicine and public health because it allows clinical as well as societal discourse to enfold an abstract but graspable object of thinking that is clearly distinguishable from other normal aspects of life. What Canguilhem and others have called the 'ontology of a disease' allows us to understand it as an entity that has acquired a qualitative difference from what is healthy, normal, and sustainable. Losing this ontological quality leads to complexity, allows for speculation, and distorts categories as well as framings and names. TB/HIV co-infection could be understood as doing both: establishing the ontology of both diseases, while continuously pointing to the contingency of their making.

We have modestly started to address TB/HIV as a branded and historically localisable concept. Yet much more epistemological work is needed to evaluate the ramifications, shortcomings, and chances of co-infection as a concept. This work is necessary, we believe, not only to be able to think differently about this pressing public health problem, but also to broaden current historical, sociological, and anthropological analysis in the field of global health, which still largely follows distinct disease or treatment entities as well as concepts of co-infection that do not challenge them epistemologically.

TB/HIV presents itself as both a singular and an exemplary problem, and as such is an important point of entry to such new forms of analysis. First, TB/HIV allows for a concrete approach to phenomena of co-infection while touching on much larger epistemological issues of biosocial entanglements. Single-disease concepts as objects of knowledge are the modus operandi in all kinds of disciplines, ranging from clinical medicine to public health to

anthropology to history. What happens to this 'gold standard' (Timmermans and Berg 2010), when diseases mingle and create both epidemiological as well as epistemological interferences, a process that can be traced through the example of TB/HIV in practice as well as in theory?

Second, TB and HIV are both archetypical diseases of what came to be known as 'global health'. It is an increasingly vast field of actors, interventions, and knowledge, where a balance between trends of universalisation and localisation needs to be mirrored in analysis, where locally and historically contingent and contextualised practices turn into universal approaches and brands, and where knowledge travels and is adapted worldwide. TB and HIV are diseases with globally standardised treatment and prevention schemes, which are yet always very much dependent on the local social, political, and economic context of their implementation. With the example of TB/HIV, one can reverse the analysis of 'implementation problems' from the ground up – to study practical problems not as implementation problems but as pragmatic problems of clinical medicine and public health struggling to localise and adapt global categories. The practical struggle to treat co-infections brings locality to the fore, and thereby allows articulation of the perpetual collision of local circumstances and global standards. What if the problem is not implementation but the way co-infections in particular and infectious diseases in general are conceived of in the first place? How can the de facto treatment for TB/HIV and other co-infections in clinical and public health settings help us to differently conceive of the concept of TB/HIV in particular and of co-infection in general?

Third, TB and HIV/AIDS have both been subject to a vast amount of scientific research and literature, medical as well as historical, anthropological, and sociological. As 'menaces of mankind', they have altered and structured the fabric of societies, fomented cultural imaginations, and laid the ground for biological citizenships, and for political and therapeutic subjectivities. The question remains: how does the brand 'TB/HIV' alter perspectives on the many facets of both diseases in the field of medical humanities, and how can these alterations be captured as a way to conceptualise an epistemology of co-infection?

If we return to the 2014 World AIDS conference, where co-infection was brought up as the coexistence of two pathogens that need to be understood in the complexity created by their coappearance, it is remarkable to see in the outlines of the conference programme how deeply the communities of TB and HIV have collaborated and corroborated already. Treatment as Prevention (TasP) has become one of the fundamental paradigms to reinvent prevention in the field of HIV, an approach that has been the basis of TB control since the 1970s in the Global North, namely as treatment of latent TB infections. Pre-Exposure Prophylaxis (PrEP) has drastically changed the overall focus on condoms as the only tool for preventive social behaviour, an approach that is paralleled in the field of TB through a

renewed focus on pharmaceutical development and indeed a second pharmaceuticalisation of the disease in the wake of multiresistant bacteria (Kehr and Condrau forthcoming). Now, TasP and DOTS in homes and houses rather than clinics appear to be slowly shifting the paradigms of HIV prevention and treatment, and the traces of TB treatment routines, especially DOTS, seem to work as a role model (Farmer et al. 2001; Holt et al. 2012). Also, the persistence of TB as the number one killer of people living with HIV has led to a slow increase in research and development activity over the last decade. New pharmaceutical substances like PaMZ (PA-824-moxifloxacin-pyrazinamide) claim to further control and regulate the occurrence of TB and to drastically shorten the treatment timeframes, spurring the TB Alliance, a nonprofit organisation advocating for the development of new anti-TB drugs, to frame it as a 'Brave New World for TB'. Here, the high-tech biomedical intervention paradigm that HIV is based on has started to replace the regimes of slow treatment and direct surveillance in the realm of TB. This shift might in part be attributed to the emergence of multiresistant and ultraresistant tuberculosis, but could also be thought of as being influenced by the entrance of TB into the realm of HIV/AIDS and vice versa, and the problematisation of both infections as diseases of global health with its focus on pharmaceutical solutions.

In sum, TB/HIV co-infection is an opportunity to further investigate why single-disease concepts have become such a crucial way of writing the history and present of medicine, of organizing conferences and structuring publications, when in fact diseases and their communities are always messy on the ground and inescapably engaged with each other. Breaking out of a single-disease framework – at least in the social sciences and humanities – might thus entail an expansion of analytic perspective as well as propel new fields of research.

Conclusion

Following entanglements rather than separations, thinking about commonalities rather than differences, and tracking actors rather than their rhetoric would be among the first steps to directly engage with co-infections and their heuristic ramifications on the ground. On a practical level, three lines of research would help to tackle the epistemological obstacles of and research opportunities for TB/HIV as well as other co-infections:

1. Historicise TB/HIV as a branded concept in the internationalised field of public health, in the North and in the South, in order to get a better understanding of this 'new entity' in biomedicine as well as the corresponding actors, institutions, and research. Processes of

localisation and universalisation, standardisation and specification, and corroboration and alteration should be taken into account. In parallel, the history of each disease, TB and HIV, should be reopened for investigation, in order to understand how the advent of HIV/AIDS influenced TB treatment and the TB community, and vice versa, to trace the genealogies of HIV/AIDS treatment and prevention through the lens of TB.

2. Investigate the '*histoire croisée*' (intersection history, Werner and Zimmermann 2006) of treatment and prevention approaches that go beyond a single-disease framework, in order to understand the communication, traffic, translation, and corroboration of thought collectives and thought styles in a reflexive manner. An initial entry point for new empirical research would be to investigate the *histoire croisée* of DOTS and HAART in the 1990s and 2000s, which would also serve as a fresh contribution to the recent history of the field of global health, its scientific logics, expert communities, and political economies. The same could be done with PreP and treatment for latent TB – to interrogate not only the circulation of knowledge and practices between disease communities and treatment approaches, but also the differing logics of public health in the Global North and the Global South, as well as the political, economic, and scientific stakes involved.

3. Develop more ethnographies of joint TB/HIV treatment and prevention initiatives – in offices and in clinical wards, in prevention centres and activist cafés, in laboratories and in homes – to trace how TB/HIV as a practical problem is conceived, managed, and treated by policy makers, doctors, nurses and, last but not least, encountered, fought and endured by millions of patients across the world today.

Following the practices, trajectories, and epistemological stakes of co-infections might then allow for the reproblematisation of some very common features relevant to the clinic, to public health, and to the field of medicine in general. Doing so will draw the gaze to those processes in which diseases are constituted, between the realm of societal assumptions, clinical manifestations, public health policy, research funding, complex and unusual symptoms, and abstract yet enduring tables of disease classifications. As a lived and treated co-infection, TB/HIV adds complexity to clinical, epidemiological, and political ways of handling the health risks for which both diseases are jointly responsible. As such, it is exemplary for everyday problems in the clinic, where standardised treatment guidelines following the logic of single diseases encounter multi-morbidity and complex syndromes, where 'doctoring' (Mol 2008), 'improvisation' (Livingston 2012), and adaptation are the rule rather than the exception of everyday practice. In this way, co-infections are more than an additive deadly duo: they are epistemological obstacles and analytic levers at the same time, with the potential to substantially enrich social science scholarship in the realm of global health.

Acknowledgements

We want to express our deep gratefulness for the inspiring discussions we had with all the participants of the international symposium 'TB/HIV: Distinct Histories, Entangled Futures. Towards an Epistemology of Co-infection', which took place at the Fondation Brocher in Geneva in February 2014 and was generously funded by the Fondation Brocher as well as the Institute for the History of Medicine of the University of Zürich. The programme, a full list of speakers, and the conference report can be found at: http://somatosphere.net/2014/03/tbhiv-distinct-historiesentangled-futures-towards-an-epistemology-of-co-infection.html. Many thanks also to the two anonymous reviewers as well as the editors of *Medicine Anthropology Theory* for their comments on an earlier draft of this article. Finally, a warm thank you to Erin Martineau for extremely careful and useful edits of this text.

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References

ACTION. 2009. *Living with HIV, Dying of TB: A Critique of the Response of Global AIDS Donors to the Co-Epidemic*. Washington, DC: RESULTS Educational Fund.

Aggleton, Peter, Peter Davis, and Graham Hart, eds. 1997. *AIDS: Activism and Alliances. Social Aspects of AIDS*. London: Taylor & Francis.

Amrith, Sunil. 2004. 'In Search of a "Magic Bullet" for Tuberculosis: South India and Beyond, 1955–1965'. *Social History of Medicine* 17, no. 1: 113–30. http://dx.doi.org/10.1093/shm/17.1.113.

Armstrong, David. 2012. 'Screening: Mapping Medicine's Temporal Spaces'. *Sociology of Health & Illness* 34, no. 2: 177–93. http://dx.doi.org/10.1111/j.1467-9566.2011.01438.x.

Bachelard, Gaston. 2002. *The Formation of the Scientific Mind*. Manchester: Clinamen.

Barnes, David. 1995. *The Making of a Social Disease: Tuberculosis in Ninenteenth-Century France*. Berkeley: University of California Press.

Bersani, Leo. 1988. 'Is the Rectum a Grave?' In *AIDS, Cultural Analysis, Cultural Activism*, edited by Douglas Crimp, 197–222. Cambridge, MA: MIT Press.

Bordowitz, Gregg. 2010. *Imagevirus: General Idea*. London: Afterall Books.

Brandt, Allan M., and David Jones. 2000. 'AIDS, Historical'. In *Encyclopedia of Microbiology*, 104–15. Waltham, MA: Academic Press.

Broekmans, J. F. 1991. 'Tuberculosis and HIV-Infection in Developing Countries'. *Tropical and Geographical Medicine* 43, no. 3: 13–21.

Bryder, Linda. 1988. *Below the Magic Mountain: A Social History of Tuberculosis in Twentieth-Century Britain*. Oxford: Clarendon Press Oxford Historical Monographs.

Calhoun, Craig. 2004. 'A World of Emergencies: Fear, Intervention, and the Limits of Cosmopolitan Order'. *Canadian Review of Sociology/Revue Canadienne de Sociologie* 41, no. 4: 373–95. http://dx.doi.org/10.1111/j.1755-618X.2004.tb00783.x.

Canguilhem, Georges. 1978. *On the Normal and the Pathological*. Dordrecht, Boston, London: Reidel.

CDC (Centers for Disease Control). 1981. 'Pneumocystis Pneumonia – Los Angeles'. *Morbidity and Mortality Weekly Report* 30 (June): 250–52.

CDC. 1991. *Tuberculosis, the Connection between TB and HIV (the AIDS Virus)*. Atlanta, GA: U.S. Dept. of Health and Human Services, Public Health Service, Centers for Disease Control.

Chabrol, Fanny. 2014a. *Prendre soin de sa population: L'exception botwanaise face au sida*. Paris: MSH Paris.

Chabrol, Fanny. 2014b. 'Biomedicine, Public Health, and Citizenship in the Advent of Antiretrovirals in Botswana'. *Developing World Bioethics* 14, no. 2: 75–82. http://dx.doi.org/10.1111/dewb.12051.

Chabrol, Fanny. 2014c. 'HIV and Hepatitis-C Coinfection in Cameroon'. Paper presented at the 'TB/HIV: Distinct Histories, Entangled Futures. Towards an Epistemology of Co-infection' symposium, Fondation Brocher, Geneva, 28 February.

Coffin, J., A. Haase, J. A. Levy, L. Montagnier, S. Oroszlan, N. Teich, H. Temin, K. Toyoshima, H. Varmus, P. Vogt, and R. Weiss. 1986. 'Human Immunodeficiency Viruses'. *Science* 232 (May): 697.

Condrau, Flurin, and Michael Worboys. 2010. *Tuberculosis Then and Now: Perspectives on the History of an Infectious Disease*. Montreal: McGill-Queen's Press.

Cooter, Roger, and Claudia Stein. 2007. 'Coming into Focus: Posters, Power, and Visual Culture in the History of Medicine'. *Medizinhistorisches Journal* 42, no. 2: 180–209.

Crane, Johanna T. 2011. 'Viral Cartographies: Mapping the Molecular Politics of Global HIV'. *BioSocieties* 6, no. 2: 142–66. http://dx.doi.org/10.1057/biosoc.2010.37.

Crimp, Douglas. 1988. 'How to Have Promiscuity in an Epidemic?' In *AIDS, Cultural Analysis, Cultural Activism*, edited by Douglas Crimp, 237–71. Cambridge, MA: MIT Press.

Crimp, Douglas. 2003. 'Melancholia and Moralism'. In *Loss: The Politics of Mourning*, edited by David L. Eng, David Kazanjian, and Judith Butler, 188–204. Berkeley: University of California Press.

Crimp, Douglas, and Adam Rolston. 1990. *AIDS Demo Graphics*. Seattle: Bay Press.

Daftary, Amrita. 2012. 'HIV and Tuberculosis: The Construction and Management of Double Stigma'. *Social Science & Medicine* 74, no 10: 1512–19.

Draus, Paul. 2004. *Consumed in the City: Observing Tuberculosis at Century's End*. Philadelphia: Temple University Press.

Engelmann, Lukas. 2012. 'Ein queeres Bild von AIDS: HIV-Visualisierungen und queere Politiken des Vergessens'. *Feministische Studien* 30, no. 2: 245–58.

Epstein, Steven. 1996. *Impure Science: AIDS, Activism, and the Politics of Knowledge*. Berkeley: University of California Press.

Faber, Knut. 1930. *Nosography: The Evolution of Clinical Medicine in Modern Times*. New York: AMS.

Fairchild, A. L., and Gerald M. Oppenheimer. 1998. 'Public Health Nihilism vs Pragmatism: History, Politics, and the Control of Tuberculosis'. *American Journal of Public Health* 88, no. 7: 1105–17.

Farmer, Paul. 2000. 'The Consumption of the Poor. Tuberculosis in the 21st Century'. *Ethnography* 1, no. 2: 183–216. http://dx.doi.org/10.1177/14661380022230732.

Farmer, Paul, Arthur Kleinman, Jim Yong Kim, and Matthew Basilico, eds. 2013. *Reimagining Global Health: An Introduction*. Berkeley: University of California Press.

Farmer, Paul, Fernet Léandre, Joia Mukherjee, Rajesh Gupta, Laura Tarter, and Jim Yong Kim. 2001. 'Community-Based Treatment of Advanced HIV Disease: Introducing DOT-HAART (Directly Observed Therapy with Highly Active Antiretroviral Therapy)'. *Bulletin of the World Health Organization* 79, no. 12: 1145–51.

Farthing, Charles F., ed. 1988. *A Color Atlas of AIDS*. Chicago: Year Book Medical Publishers.

Fassin, Didier. 2007. *When Bodies Remember: Experiences and Politics of AIDS in South Africa*. Berkeley: University of California Press.

Fee, Elizabeth, and Daniel M. Fox, eds. 1992. *AIDS: The Making of a Chronic Disease*. Berkeley: University of California Press.

Fleck, Ludwik. 1981. *Genesis and Development of a Scientific Fact*. Edited by Thaddeus J. Trenn and Robert K. Merton. Chicago: University of Chicago Press.

Frick, Mike, and Eleonora Jiménez-Levi. 2013. *Report on Tuberculosis Research Funding Trends, 2005–2012*. New York: Treatment Action Group.

Gallo, Robert. 1987. 'The AIDS Virus'. *Scientific American*, no. 1 (January): 46–57.

Gandy, Matthew, and Alimuddin Zumla. 2003. *The Return of the White Plague: Global Poverty and the 'New' Tuberculosis*. London: Verso.

Getahun, Haileyesus, Christian Gunneberg, Reuben Granich, and Paul Nunn. 2010. 'HIV Infection–Associated Tuberculosis: The Epidemiology and the Response'. *Clinical Infectious Diseases* 50, no. s3: S201–07. http://dx.doi.org/10.1086/651492.

Gradmann, Christoph. 2005. *Krankheit im Labor: Robert Koch und die medizinische Bakteriologie*. Göttingen: Wallstein.

Greub, G., B. Ledergerber, M. Battegay, P. Grob, L. Perrin, H. Furrer, and P. Burgisser. 2000. 'Clinical Progression, Survival, and Immune Recovery during Antiretroviral Therapy in Patients with HIV-1 and Hepatitis C Virus Coinfection: The Swiss HIV Cohort Study'. *The Lancet* 356, no. 9244: 1800-05. http://dx.doi.org/10.1016/S0140-6736(00)03232-3.

Harden, Victoria A., and Anthony Fauci. 2012. *AIDS at 30: A History*. Washington, DC: Potomac Books.

Harper, Ian. 2006. 'Anthropology, DOTS and Understanding Tuberculosis Control in Nepal'. *Journal of Biosocial Science* 38, no. 1: 57.

Harrington, Mark. 2010. 'From HIV to Tuberculosis and Back Again: A Tale of Activism in 2 Pandemics'. *Clinical Infectious Diseases* 50, no. s3: S260–66. http://dx.doi.org/10.1086/651500.

Holt, M., D. A. Murphy, D. Callander, J. Ellard, M. Rosengarten, S. C. Kippax, and J. B. F. de Wit. 2012. 'Willingness to Use HIV Pre-Exposure Prophylaxis and the Likelihood of Decreased Condom Use Are Both Associated with Unprotected Anal Intercourse and the Perceived Likelihood of Becoming HIV Positive among Australian Gay and Bisexual Men'. *Sexually Transmitted Infections* 88, no. 4: 258–63. http://dx.doi.org/10.1136/sextrans-2011-050312.

Kaufmann, S. H. E., and Bruce D. Walker, eds. 2009. *AIDS and Tuberculosis: A Deadly Liaison*. Weinheim: Wiley-VCH. PDF e-book. http://public.eblib.com/EBLPublic/PublicView.do?ptiID=481853.

Kehr, Janina. 2012a. 'Blind Spots and Adverse Conditions of Care: Screening Migrants for Tuberculosis in France and Germany'. *Sociology of Health & Illness* 34, no. 2: 251–65. http://dx.doi.org/10.1111/j.1467-9566.2011.01415.x.

Kehr, Janina. 2012b. *Une maladie sans avenir: Anthropologie de la tuberculose en France et en Allemagne*. Paris: Ecole des hautes études en sciences sociales.

Kehr, Janina, and Flurin Condrau. Forthcoming. 'Recurring Revolutions? Tuberculosis Treatment in the Era of Antibiotics'. In *Therapeutic Revolutions: Pharmaceuticals and Social Change in the Twentieth Century*, edited by Jeremy Greene, Flurin Condrau, and Elizabeth Siegel Watkins. Chicago: University of Chicago Press.

Keshavjee, Salmaan, MD. 2014. *Blind Spot: How Neoliberalism Infiltrated Global Health*. Berkeley: University of California Press. http://public.eblib.com/choice/publicfullrecord.aspx?p=1711048.

Koch, Erin. 2013a. 'Tuberculosis Is a Threshold: The Making of a Social Disease in Post-Soviet Georgia'. *Medical Anthropology* 32, no. 4: 309–24. http://dx.doi.org/10.1080/01459740.2012.751384.

Koch, Erin. 2013b. *Free Market Tuberculosis: Managing Epidemics in Post-Soviet Georgia*. Nashville, TN: Vanderbilt University Press.

Lakoff, Andrew. 2010. 'Two Regimes of Global Health'. *Humanity: An International Journal of Human Rights, Humanitarianism, and Development* 1, no. 1: 59–79. http://dx.doi.org/10.1353/hum.2010.0001.

Livingston, Julie. 2012. *Improvising Medicine: An African Oncology Ward in an Emerging Cancer Epidemic*. Durham, NC: Duke University Press.

Mayer, Kenneth H., and Carol Dukes Hamilton. 2010. 'Synergistic Pandemics: Confronting the Global HIV and Tuberculosis Epidemics'. *Clinical Infectious Diseases* 50, no. s3: S67–70. http://dx.doi.org/10.1086/651475.

Mol, Annemarie. 2008. *The Logic of Care: Health and the Problem of Patient Choice*. London, New York: Routledge.

Nambuya, A., N. Sewankambo, J. Mugerwa, R. Goodgame, and S. Lucas. 1988. 'Tuberculous Lymphadenitis Associated with Human Immunodeficiency Virus (HIV) in Uganda'. *Journal of Clinical Pathology* 41, no. 1: 93–96. http://dx.doi.org/10.1136/jcp.41.1.93.

Narain, Jai P., Mario C. Raviglione, Arata Kochi, and WHO Tuberculosis Programme. 1992. 'HIVAssociated Tuberculosis in Developing Countries: Epidemiology and Strategies for Prevention'. Geneva: WHO. http://apps.who.int//iris/handle/10665/60944.

Ogden, Jessica, Gill Walt, and Louisiana Lush. 2003. 'The Politics of "Branding" in Policy Transfer: The Case of DOTS for Tuberculosis Control'. *Social Science & Medicine* 57, no. 1: 179–88. http://dx.doi.org/10.1016/S0277-9536(02)00373-8.

Oppenheimer, Gerald M. 1988. 'In the Eye of the Storm: The Epidemiological Construction of AIDS'. In *AIDS: The Burdens of History*, edited by Elizabeth Fee and Daniel M. Fox, 267–300. Berkeley: University of California Press.

Packard, Randall M. 1989. *White Plague, Black Labor: Tuberculosis and the Political Economy of Health and Disease in South Africa*. Berkeley: University of California Press.

Packard, Randall M., and Paul Epstein. 1991. 'Epidemiologists, Social Scientists, and the Structure of Medical Research on AIDS in Africa'. *Social Science & Medicine* 33, no. 7: 771–83.

PAHO (Pan-American Health Organisation). 1993. 'Association between HIV and Tuberculosis : Technical Guide'. Washington, DC: PAHO. http://apps.who.int/iris/handle/10665/48822.

Patton, Cindy. 2002. *Globalizing AIDS*. Minneapolis: University of Minnesota Press.

Pepin, Jacques. 2011. *The Origins of AIDS*. Cambridge: Cambridge University Press.

Preda, Alex. 2005. *AIDS, Rhetoric, and Medical Knowledge*. Cambridge: Cambridge University Press.

Quirke, Viviane, and Jean-Paul Gaudillière. 2008. 'The Era of Biomedicine: Science, Medicine, and Public Health in Britain and France after the Second World War'. *Medical History* 52, no. 4: 441–52. http://dx.doi.org/10.1017/S002572730000017X.

Raviglione, Mario C., Jai P. Narain, and Arata Kochi. 1992. 'HIV-Associated Tuberculosis in Developing Countries: Clinical Features, Diagnosis and Treatment'. *WHO Bulletin* 70, no 4: 515–26. http://apps.who.int//iris/handle/10665/51590.

Rees, Tobias. 2014. 'Humanity/Plan; Or, on the "Stateless" Today (Also Being an Anthropology of Global Health)'. *Cultural Anthropology* 29, no. 3: 457–78. http://dx.doi.org/10.14506/ca29.3.02.

Rosenberg, Charles E. 2002. 'The Tyranny of Diagnosis: Specific Entities and Individual Experience'. *The Milbank Quarterly* 80, no. 2: 236–60.

Salive, M. E., D. Vlahov, and T. F. Brewer. 1990. 'Coinfection with Tuberculosis and HIV-1 in Male Prison Inmates'. *Public Health Reports* 105, no. 3: 307–10.

Shannon, Gary W., and Gerald F. Pyle. 1989. 'The Origin and Diffusion of AIDS: A View from Medical Geography'. *Annals of the Association of American Geographers* 79, no. 1: 1–24.

Singer, Merrill. 1996. 'A Dose of Drugs, a Touch of Violence, a Case of AIDS: Conceptualizing the SAVA Syndemic'. *Free Inquiry in Creative Sociology* 24, no. 2: 99–110.

Singer, Merrill. 2009. *Introduction to Syndemics: A Critical Systems Approach to Public and Community Health*. London: John Wiley & Sons.

Singer, Merrill, Pamela I. Erickson, Louise Badiane, Rosemary Diaz, Dugeidy Ortiz, Traci Abraham, and Anna Marie Nicolaysen. 2006. 'Syndemics, Sex and the City: Understanding Sexually Transmitted Diseases in Social and Cultural Context'. *Social Science & Medicine* 63, no. 8: 2010–21. http://dx.doi.org/10.1016/j.socscimed.2006.05.012.

Smelyanskaya, Marina, and Treatment Action Group. 2013. *Global Investments in HIV Treatment Research and Development in 2010 and 2011*. New York: Treatment Action Group.

Strange, Carolyn, and Alison Bashford. 2003. *Isolation: Places and Practices of Exclusion*. New York: Routledge.

Taylor, E. Michelle, and Ian Harper. 2014. 'The Politics and Anti-Politics of the Global Fund Experiment: Understanding Partnership and Bureaucratic Expansion in Uganda'. *Medical Anthropology* 33, no 3: 206–22. http://dx.doi.org/10.1080/01459740.2013.796941.

Timmermans, Stefan, and Marc Berg. 2010. *The Gold Standard: The Challenge of Evidence-Based Medicine and Standardization in Health Care*. Philadelphia: Temple University Press.

Treichler, Paula A. 1988. 'AIDS, Homophobia, and Biomedical Discourse: An Epidemic of Signification'. In *AIDS, Cultural Analysis, Cultural Activism*, edited by Douglas Crimp, 31–70. Cambridge, MA: MIT Press.

Vidal, Laurent, and Christopher Kuaban, eds. 2011. *Sida et Tuberculose : La Double Peine? Institutions, Professionnels et Sociétés Face À La Coinfection Au Cameroun et Au Sénégal*. Louvain-la-Neuve: Academia Bruylant.

Watney, Simon. 1987. *Policing Desire, Pornography, AIDS, and the Media*. Minneapolis: University of Minnesota Press.

Welshman, J., and A. Bashford. 2006. 'Health Screening – Tuberculosis, Migration, and Medical Examination: Lessons from History'. *Journal of Epidemiology and Community Health* 60, no. 4: 282–84. http://dx.doi.org/10.1136/jech.2005.038604.

Werner, Michael, and Bénédicte Zimmermann. 2006. 'Beyond Comparison: Histoire Croisée and the Challenge of Reflexivity'. *History and Theory* 45, no. 1: 30–50. http://dx.doi.org/10.2307/3590723.

WHO (World Health Organization). 2004. *Report of the Fourth Global TB/HIV Working Group, Addis Ababa, September 2004*. Geneva: WHO. http://apps.who.int//iris/handle/10665/83799.

WHO and Department of HIV/AIDS. 2004. *Interim Policy on Collaborative TB/HIV Activities*. Geneva: World Health Organization.

WHO Global Tuberculosis Programme. 1995. 'Tuberculosis and HIV Research: Working towards Solutions. Results of a WHO Workshop on the Formulation of a New TB/HIV Research Strategy, Geneva, 29–31 May 1995'. Geneva: WHO. http://apps.who.int/iris/handle/10665/62662.

WHO Global Tuberculosis Programme and UNAIDS. 1996. 'Tuberculosis in the Era of HIV: A Deadly Partnership'. Geneva: WHO. http://apps.who.int/iris/handle/10665/63507.

WHO Stop TB Initiative. 2002. *Strategic Framework to Decrease the Burden of Tuberculosis*. Geneva: WHO. http://apps.who.int//iris/handle/10665/67293.

WHO Tuberculosis Programme. 1994. 'The HIV/AIDS and Tuberculosis Epidemics: Implications for TB Control'. Geneva: WHO. http://apps.who.int/iris/handle/10665/58230.

Yingling, Thomas E. 1997. *AIDS and the National Body*. Durham, NC: Duke University Press.

Yoon, Cecilia J. 2007. 'HIV–TB: A Perfect Storm'. *AIDS Reader* 17, no. 6: 302–06.