

SARS and the Global City:

urbanization and infectious disease in the global era

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Abstract

This paper is about the systematic relationships between urbanization and disease in the age of the global city. We argue in this paper that the spread of the SARS virus is a somewhat predictable consequence of contemporary globalization. In this light, this paper investigates the issue of how processes of globalized urbanization (world city formation and the emergence of networks amongst these world cities) have affected the transmission and response to SARS within the context of Toronto as a global city. On a more general level this paper contributes to the understanding of how pathogens interact with economic, political and social factors to represent a threat to human life in an increasingly globalized world. Notably, we will discuss how the rise and spread of newly emerging and resurgent diseases is influenced by political and economic power at a variety of scales, ranging from the transnational down to the household and individual levels. This investigation of Toronto as a global city under the threat of a major outbreak of a new and dangerous infectious disease will contribute to the study of globalizing cities overall.

Introduction¹

If the rise of farming was ... a bonanza for our microbes, the rise of cities was a greater one, as still more densely packed human populations festered under even worse sanitation conditions (Diamond, 1999: 205)

The explosive increase of world travel by Americans, and in immigration to the United States, is turning us into another melting pot – this time, of microbes that we previously dismissed as just causing exotic diseases in far-off countries (Diamond, 1999: 206)

The spread of Severe Acute Respiratory Syndrome (SARS) in Toronto and other major cities in 2003 can be read as a direct consequence of increased globalization of connectivity throughout the world. In Toronto alone 44 people died, hundreds were sick and thousands were isolated in home quarantine. The rapid spread of the virus across continents, from the countryside to the city and back and through formerly disparate communities posed new and challenging problems for governments and communities. In this light, we argue that the diffusion and response to the SARS virus may, in part, be understood by considering the inherent character of the “global city” as well as the networked connections of such cities. To investigate this relationship we focus on how the intersection of globalization and urbanization processes may have influenced the spread and response to infectious disease.

As is suggested in the two opening quotes by Jared Diamond, continued urbanization and accelerated globalization may have something to do with understanding and ultimately acting

¹ We are extremely grateful for the research assistance of Sarah Sanford.

upon the rapid spread of often new strains of infectious disease causing microbes. Infectious diseases such as SARS have a number of important and potentially dangerous consequences for life in the global(ized) city. One of these consequences is the loss of security with regards to urban health governance. In part, this consequence could be attributed to the loss of clear boundaries for urban jurisdictions as intensified by the “deterritorialization of the state” fuelled by the rise of the world system of cities and the forces of global economic liberalization (Keil, 1998; Friedmann, 1986). Such developments, as we shall see, contribute to a particular vulnerability of urban centres to disease outbreaks in contemporary reality. In the study of Toronto as a ‘global’ city lies an important key to understanding the social, cultural and geographic dimensions of the SARS crisis. Furthermore, such knowledge can be utilized to in the development of more effective public health strategies – that is, disease outbreak policies that are more in tune with the new globalized reality of contemporary multicultural existence in Toronto. The growing challenge presented by global city formation to the fiscal and institutional capacity of the local state to respond to crisis of various sorts (including a crisis in public health) may not only be exacerbated by the “institutional void” noted by Hajer (2003) but also through the ongoing re-scaling of political spaces in a rapidly changing world. We will touch on both global city formation and re-scaling again below, but we start our analysis by addressing the broader question of how the capability of the government to maximize its prosperity and stability, while protecting the population and enabling it to adapt to diverse crises, can be affected by the politics of a globalized city that is now directly influenced by policies originating in international agencies?

In 2003, the World Health Organization (WHO) directly reached into the well-being of Toronto’s economy and public culture by issuing a worldwide advisory that recommended that visitors be cautious about planned travel to this city. An indication of a new global city politic was evident

as politicians from Toronto boarded planes to convince the WHO to rescind its advisory, taking with them images of the most diverse cities in the world. As part of our task is to understand the response to SARS, we we need to consider the ways in which multi-scaled governance of this global health crisis may be understood in the context of economic and cultural globalization and interdependence. As such we must take into account how issues of sovereignty and jurisdiction are affected by SARS in a world with more porous boundaries? Specifically, how can a global city cope with a set of social, economic and ecological problems whose causes and solutions extend beyond the traditional urban region. Notably, what are the implications of such issues for the establishment of a health security state in a globalized world? Was it political economic pressures (and not health-based concerns) that persuaded federal and municipal officials to lobby for the lifting of the WHO travel advisory imposed on Toronto? (Walkom, 2003). In effect, the WHO travel alert may have, at least temporarily, jeopardized the world city status of Toronto as evidenced by the severe economic impacts experienced by the city (Kickbusch, 2003).² Efforts by local political and economic elites to restore that status, critics contend, led to a premature lessening of public health vigilance in regard to SARS in Toronto, a claim supported by the fact that a second SARS outbreak occurred soon after the travel advisory was lifted with the official declaration that the state of emergency was over (Boyle, 2003). Others have argued that the WHO travel advisory imposed on Toronto would ultimately harm the fight against SARS as other world cities may become less forthcoming in reporting outbreaks (Galloway, 2003). Both positions illustrate how the local health security regime may be influenced/compromised in today's network of world cities. The flipside of the concern about Toronto's global city status in light of the SARS crisis were persistent racist and classist undertones that singled out the Chinese community

² Based on comparisons to previous years economic activities, estimated economic impacts on the city's businesses was significant: the tourism business sustained a loss of \$350 million, the reduction in airport activity led to a loss of \$200 million, while non-tourism retail sales plummeted by \$380 million (Naylor et al, 2003:211).

and health care workers bearers of disease (Cheung, 2003; Grinspun, 2003). We begin with a selective review of the historical relationships of cities and disease to provide the backdrop to current situation involving the SARS outbreaks.

Urbanization and Infectious Disease

At the beginning of this brief review of the relationships of urbanization and infectious disease must be the admission that both concepts in this relationship are highly complex affairs and no linear connections are likely to be found. Two related concepts can be distinguished in regard to the former. First there is the concept of 'urbanization', which, most would agree, at some level "refers to change in size, density, and heterogeneity of cities" (Vlahov and Galea, 2002: 51). The second, related, concept is 'urbanicity', which has been defined as "the impact of living in urban areas at a given time" (Vlahov and Galea, 2002: 51). Both 'urbanization' and 'urbanicity' are, for the purposes of this paper, assumed to have changed rapidly and fundamentally in recent years. What has also changed is the notion of the urban itself, which now contains socio-spatial forms as different as "city centers, periurban fringe areas, and densely populated isolated regions" (Vlahov and Galea, 2002: 54). It does indeed make sense to argue that "understanding the dynamic process of urban change and how urbanization changes the conditions of urbanicity is essential to the study of urban health" (Ibid.: 55).

David Harvey's classical and concise statement adds power and structure to the rather value-free definition of urbanization and urbanicity above:

Urbanization concentrates productive forces as well as labor power in space, transforming scattered populations and decentralized systems of property rights into massive concentrations of political and economic power that are eventually consolidated in the legal and military apparatus of the nation state. 'Nature's

forces' are subjected to human control as transport and communications systems, territorial divisions of labor, and urban infrastructures are created as foundations of capital accumulation. (2000: 25)

Two qualifications are in order in the context of the work we are presenting here: First, the process of urbanization we are encountering in the world of the global city has long outgrown the logic of the structuring of spaces that could be easily consolidated in the nation state. We will concern ourselves here with a new type of city, the global city, which has emerged in a network of control centers spread across the entire world (Brenner and Keil, 2005; Taylor, 2004; Knox and Taylor, 1995; for a historically valuable yet outdated view see Hall, 1984). The productive forces that are currently harnessed into this system have long left the spatial container and geographic scale of the nation state behind (Olds and Yeung, 1999). Second, we now – and Harvey does so himself at other occasions – express more care in using the notion of 'subjecting nature's forces' when it has been demonstrated many times in just recent years that such hubris may be misguided. Urbanization may appear to subdue nature and may fetishize the technological processes by which this is achieved (Kaïka and Swyngedouw, 2000) but it can hardly be entirely subjected. Moreover, it is the *societal relationships with nature* rather than nature per se that deserves our attention, much like *relationships of urbanization*, rather than the fictional 'city', is the process we need to examine more closely.

One way this connection has historically been achieved is through some, often contested, approaches of 'ecology'. Taking up the theme of 'scales', which we have also employed in a different context of this analysis (see Anonymous), Mayer has noted that:

The social sciences consider scales from the individual to the global. Human ecology is the study of how individuals and groups interact with one another. This is best appreciated within the context of the natural environment as well. Disease

ecology, so basic to medical geography and epidemiology, is also a powerful approach to understanding disease emergence and resurgence. (Mayer, 2000: 938)³

Yet, as Mayer himself has qualified that “[d]isease geography has escaped most of the debates that involve issues of new theories and methodologies which have been significant in other subfields of geography (...) Rather, it has been dominated by logical positivism and the scientific method” (quoted in Craddock 1995: 957). We will seek to avoid the pitfalls of such positivist thinking in our analysis below for which we propose a critical discourse analytical approach. For Mayer, the solution to finding a way out of the positivist legacy is ‘political ecology’, which he uses “as an interpretative framework for disease emergence (2000: 938). He further notes that the political ecology of infectious disease “combines elements of traditional disease ecology with concepts of political economy that have been very productive in explaining a whole variety of human projects” (Ibid.: 948). The advantage of using such an approach is that it can “alter the concepts of the causality of disease from a purely biomedical concept to one that also incorporates the unintended aspects of human action” (Ibid). We will take this suggestion up in making use of a more specialized debate around the more precise notion of an “urban political ecology”, which connects concerns about urbanization, politics and ecology in a more direct manner than the political ecology approach, which has often been used in the context of rural or forest-based societies in the global South (Keil, 2004). Notably, this focus on *urban* political ecology can draw attention to the fact that any disease “is as much a matter of social, ecological and geographical change as it is of smaller scale molecular or microbiological phenomena. Indeed, the meaning of disease causation changes when considering it in social and ecological contexts. The germ theory of disease and the doctrine of

³ McMichael (2002) has differentiated three main changes in human ecology over the last 2 centuries: industrialization, urbanization and increased control over fertility.

specific etiology concentrated much attention on the smaller scale, microscopic and submicroscopic scales of disease. Yet, causation can also be expanded to larger scales, and though not refuting the germ theory, by so doing, it adds to our understanding of disease causation” (Mayer, 2000: 938). In other words, to more fully understand the spread of disease between and within urban centres requires the explicit incorporation of factors related to the social and ecological context, that is, those factors usually excluded by conventionally reductionist epidemiological approaches (Ali, 2004; Novogradec and Ali, 2004). Further, as Anthony McMichael has expressed elegantly: “The career of *Homo sapiens* has now reached an important juncture, at a global scale, that obliges us to assess the likely health effects for a population of today’s large-scale transformations in the conditions of living” (2002: 1145; see also Waters, 2001: 81). We will interrogate such statements on the scale of the human condition and the scale of transformations in our sections below on the specific relationship of global-cityness and SARS.

The (re)emergence of infectious diseases

The emergence and re-emergence of infectious disease has now been recognized as an outcome of the overall growth in the openness and complexity of human societies (Institute of Medicine, 1992, 2003). This is evidenced, for example, by the fact that in 1997, infectious diseases were the leading cause of deaths worldwide (Kombe and Darrow, 2001; see also Feldmann, et al., 2002 for a thorough review of these developments). Realizing that increased openness and complexity of social arrangements can easily be cited as causative factors implicated in many other problems that plague the human community, some of the major societal determinants of emerging and re-emerging infectious disease include: population growth, global warming, urbanization, dam building, travel, warfare, the spread of sexually

transmitted diseases, the contamination of the environment with waste, poverty and malnutrition, public health infrastructure or policy breakdown or deficiency, increased numbers of refugees and internally displaced persons, and an increase in aging population (McMichael, 2002: 1147; Louria, 2000: 583; see also Lashley, 2002). In this light, it is particularly important to recognize the interconnection of these variables in addressing all matters of infectious disease through policy action (ibid). For example, the spread of many infectious diseases is directly proportional to population density and can be further exacerbated by low levels of hygiene. In addition to the impact of urbanization on the environment, economy and physical resources, there are more opportunities for contact and transmission through public transport, restaurants, libraries, etc. (Sattar, Tetro and Springthorpe, 1999). In the context of open and complex social systems, the transmission of the virus itself can be characterized in terms of the useful notion of “viral traffic” (Morse, 1993) or more generally as “microbial traffic” (Mayer, 2000: 940) and we will return to this later when exploring the phenomenon of the diffusion of the SARS coronavirus in the contemporary global setting.

As alluded to briefly above, Gratz (1999) attributes vector proliferation to significant ecological changes including dam construction, irrigation systems, deforestation, human population migrations, industrialization and urbanization. Overall, regardless of the level of development or underdevelopment, political systems, social structures or other cultural influences, it may be fair to say that increased sprawl of human settlement across natural landscapes into previously non-settled areas and particularly to the edges of wooded areas have increased the disease infection potential. In particular, the renewed restructuring of the relationships of urban and agricultural areas – for example the transformation of marshy areas near cities into rice paddies – has played a role in the (re-)emergence of infectious disease in human formations by increasing the likelihood of human contact with infectious disease agents (Gratz, 1999). In

particular, as Lines et al. (1994) have pointed out, vector-borne disease in urban areas is connected to specific human activities and the physical features of such areas and this highlights the importance of the relationship of social and ecological factors in disease diffusion. Such recognition, for example, brings to the fore socio-ecological factors in disease diffusion as: the migration of disease carriers, population density and distribution, the transformation of naturally diverse areas into more uniform ones (thus narrowing the spectrum of breeding sites for vectors, lowering the diversity of species, while increasing the numbers of existing species), the development of artificial breeding sites (which is associated with waste, water supply, sanitation and drainage systems – and a general decrease in competition). The authors note in particular that the urban poor in cities of the South may experience “the worst of both worlds” at the urban/rural interface (1994: 115). The urban/rural interface may also represent a place where species-interaction and the cross-species transfer of pathogens may occur as animal-human and human-human forms of infection come together.

Changing patterns of urbanization and Re-emerging Infectious Diseases

It has been a common trope in the literature and in our common understanding of urbanization that the more urbanized, industrial and modern our forms of settlement become, the less we are threatened by infectious disease. Of course, statements of this sort are largely true and their deadly reality is particularly visible in the absence of the assumed urbanization-modernization-nexus in the burgeoning cities of the South, where urbanization has come without the benefit of the modernization of urban infrastructures, water and sewer systems, health care systems, educational facilities, general wealth, etc. In much of what we call Third World cities, humans are threatened profoundly by air and water borne infectious diseases. Children in particular are the victims of unhealthy, unsanitary living conditions bred in systemic poverty stemming from long histories of colonialism and imperialism (Satterthwaite, 1993;

Gratz, 1999; Gugler, 1996; Kumate 1997; Mutatkar, 1995). Indeed, the histories of both urbanization and disease find shared ground in the notion of 'control', which finds its institutional and procedural expression in Public Health, as a predominantly urban enterprise located in the state apparatus. The history of modern urbanization can perhaps be written as a history of disease control with all its beneficial and threatening connotations. In industrialized countries such as the USA, national health threats were countered by government policy and environmental measures aimed first at 'natural' nuisances such as swamps and later at 'urban' nuisances such as filth and garbage (Fee and Brown, 2002). In this light, it has been noted by Mexican medical authority Jesus Kumate that: "the history of Public Health is an uninterrupted succession of actions to control, eliminate or eradicate infectious diseases. (...) In all cases, the balance of effort has been positive, even when the original objective has not been reached" (1997: 156). The coincidence of improvements to urban sanitation and advances in the medical sciences led to a certain "complacency over the supposed conquest of infectious diseases" (Mayer, 2000: 938). Such complacency, however, has recently been challenged as "the victory against infectious diseases has turned into a menace" (Sattar, Tetro and Springthorpe, 1999: 5). Even in the formerly secure micro-environments of the suburban North American home has experienced a crisis of infectious disease recurrence, fuelled by such social changes as population growth and changing demographics, increasing use of group care for children and the elderly, movement toward ambulatory and home care (shift of infection to community), organ transplantations, increasing prevalence of HIV, change in food consumption patterns and home hygiene practices, misuse of antibiotics, faster and more frequent long-distance travel, diminishing investment in health care and other social services, and climatic and weather changes (Sattar, Tetro and Springthorpe, 1999). The somewhat alarmist literature that goes along with laying out the grimy facts of the consequences of risk society in the area of infectious disease is not entirely without validity, as the list of possible

dangers to middle class citizens of industrialized countries like the USA and Canada keeps rising: war (terrorism), disasters, poverty, drug-abuse, unsafe sex, malnutrition, chemical pollution, transfusion of tainted blood, deforestation, political upheavals, and homelessness – importation of foreign animals, and the list of potential dangers goes on (Sattar, Tetro and Springthorpe, 1999). In addition, in recent years there has been a noted reversal of the earlier progress made in urban population health. Since the 1980s, the term “urban (health) penalty,” has been introduced to express the relatively worse health conditions in cities even in developed countries (Vlahov and Galea, 2002; 2003; Andrulis, 1997). At the same time, it has been noted that “research about the features of modern urban areas and the facets of urban living that influence health has been sparse” (Vlahov and Galea, 2003: 2). As we will argue throughout this paper, two kinds of research areas have not yet been sufficiently worked on: 1) the specific urbanicity of the globalized city; and 2) the impact of the scaled, networked, and connected character of urban areas in a globalized world has received even less attention by researchers. We believe that this is possibly an Achilles’ heel of the research that has been done so far.

We may now have to look at these common tropes again from a new perspective. “Infectious diseases, once thought to be on the wane, are still very much a factor both within developed and developing countries” (Mayer, 2000: 950). “The city as vector” has become a new reality not just in the burgeoning urban poverty areas of the southern hemisphere but also in the rapidly globalizing and sprawling conurbations of the global north: “Urbanization and global migration propel radical changes in human behavior as well as in the ecological relationship between microbes and humans” (Garrett, 1996: 72). Kumate adds that it is “reasonable to expect that infectious diseases would have an outstanding presence in the epidemiological profile of the twenty-first century” and identifies the following determinants as affecting the

spread of infectious diseases: aging population and increased susceptibility; increasing and permanent urbanization; convenience of food preparation; globalization of economic and other activities; colonization of previously uninhabited areas; and negative aspects of medical advances in diagnosis and treatment involving more invasive procedures (1997). A macroscopic perspective has been suggested as necessary for the understanding of changes and differences in health. Three dimensions of this macroscopic view can be distinguished: rapid changes due to globalization and urbanization, large scale environmental changes and the global debate on an ecologically sustainable future (McMichael, 2002: 1145; see also Waters, 2001). In particular, McMichael notes that a succession of four profound transitions in human ecology has occurred over the centuries, and the present transition has now reached new proportions and aspects of this transition are changing food production; social structures; urban living; reproductive behaviour and demographic profile (see also Epstein, 1992). According to Michael (2002), the present transition is characterized by the global nature of the large-scale pressures of human activity on the natural environment, as seen for example by: global climate change, stratospheric ozone depletion, loss of biodiversity, land degradation, depletion of wild fisheries. As a consequence of these global changes, the anticipated effects on human health are likely to emerge over the following decades, but many of the causal pathways are difficult to determine because of their complexity and indirect nature and multivariate causality of disease; that is, those attributable to the complex interconnections of social, biological, cultural factors. Further, the lag period between decline of environmental conditions and subsequent health effects makes it difficult to determine extent of environmental impact on health (McMichael, 2002: 1147). The global and long-term view has gained much attention in recent years as researchers have begun to develop an understanding “of how global trends affect the health of households and communities in different ways throughout the world. Such an understanding can be gained by recognizing that health is part

of the fabric of every society, and more importantly, that the fabrics of all nations and societies are part of a single tapestry, in which global health is an important strand” (Waters, 2001: 80).⁴

We have recently begun to understand better that the security urban dwellers in western industrialized countries feel in regard to the dangers of disease may be misplaced. Scholars and pundits have been pointing out that our hold on urban health may be more tenuous than we have wanted to admit (Sattar, Tetro and Springthorpe, 1999). Medical journalist Laurie Garrett (1994a, b; 1996) for example, has shown in a series of high profile publications that the optimism based on the anti-viral and anti-bacterial warfare through the mass administration of antibiotics and vaccines may be misplaced. She reports that this optimism rests on two inaccurate assumptions: the treatment of microbes as “biologically stationary targets and that infectious disease could be geographically sequestered” (Garrett, 1996: 67). One speaks of “geographical sequestration”, for example, when traveling populations were held in ports before they were allowed to enter a country or a city. With the tremendous speed-up of travel due to changes in technology, and particular due to the explosive growth of air travel, the two assumptions of the stationary and confined character of infectious diseases were tested severely (Garrett, 1996). The notion of a “global village” has gained influence in the way we are looking at *one* world of potential diseases (Sattar, Tetro and Springthorpe, 1999: 5). Humans are now globally mobile disease vectors (Lashley, 2003). In addition to the speed-up of travel, the expansion of population raised the statistical probability of pathogen transmittal and potentially counteracted or neutralized health improvement gains reached by better infrastructural conditions (Garrett, 1996).

⁴ McMichael states that despite the big picture represented by these macroprocesses, research has been stuck in a mode that favours the individual and personal behaviour, a tendency, which is likely to be strengthened through “postgenomic medical research” (2002: 1145).

Urban Connectivity and the Spatial Diffusion of New Diseases

The SARS outbreak in Toronto and other cities around the world in 2003 has shown how pathogens interact with economic, political and social factors to represent a threat to human development and society in an increasingly complex, globalized and urbanized world. This complex world, it is assumed, has a greater degree of 'connectivity' than existent or even possible before. Connectivity is intimately related to notions of technological advances and social possibility. For example, increased connectivity forms the basis of the "network society" which has supposedly arrived largely because of the rapid and ubiquitous spread of spaces of flows in concrete networked grids of electronic information (Castells, 1997). Furthermore, connectivity between urban centres is enhanced by advances in transportation, information and communication technologies which are seen as crucial to not only the increased connectivity of human societies across continents and globally but also internally. More or less simplistic interpretations of technological change as social change must be rejected though. As authors such as Graham and Marvin (2001; Graham, 2000; 2004) have pointed out, networked connections in the age of the cybercity may be more, rather than less socially just, spatially even and politically democratic (for a critique see Coutard, 2002; Graham, 2002). Saskia Sassen has pointed to the necessity of viewing technological and informational connectivity as embedded in social processes: "One fact that has become increasingly evident is that to maximize the benefits of the new information technologies, you need not only the infrastructure but a complex mix of other resources" (2000: 108). Technological connectivity and social connectivity must be seen in relation to one another. For our purposes this has two consequences: first, the spread of SARS in a globally connected world is a consequence of this increased technical *cum* social connectivity. It has also, as Harvey (1998) has observed so insightfully, the re-scaled connection of the body to processes of globalization that is at work

here. Second, this insight casts light on those processes and topologies that may be commonly underrepresented in depictions of globalization. When global travelers leave the “de-territorialized” spaces of airports and hotels and where people interact in the interstices of the globally connected money markets of the global city, places and spaces come into sharp relief, where the production processes of globalization really occur through and in the everydayness of the global city network’s multi-scaled neighbourhoods (Flusty, 2003; Keil, 1998; Sassen, 1998).⁵ In this light, we can add ‘ecological connectivity’ to Sassen’s technological and social connectivity. It is not just social communities and individuals that get better connected and differently articulated in the process of global urbanization. Ecologically previously unconnected or less connected areas, biotopes, and species are now potentially connected through new forms of socio-technologically re-scaled activities such as air travel. Cross-species transfer, for example, played an important role in the bio-physical origins of the SARS epidemics. In this context, what is of critical importance for the present study is the relationship between the cross-species transfer and spatial diffusion of the SARS virus. Rural China, where a coronavirus based in wild animals (the palm civet is suspected (Guan et al., 2003)) crossed the species boundary into humans in the process of handling live animals in animal markets in urban China, is now only an airplane ride away from distant places on the globe, such as the Toronto region. In turn, a health care worker, who became infected in Toronto, was only a plane trip away from a wedding party in the Philippines, where she could potentially infect an entirely unrelated group of people (Scrivner, 2003). Both people and viruses are ‘jumping scales’ and are breaking down traditional boundaries of time, space and the human everyday. Further, the infection of a member of a tightly knit Toronto religious

⁵ Mark Gottdiener has made a related point very convincingly in his treatment of airports: “The airport has taken on the characteristics of Simmel’s city to an extreme. It has all the trappings of a thoroughly instrumental space with even less of a need for people to interact. In fact, the airport norm is one of *non-interaction*” (2004: 187). A similar case can be made about hotels. Coppola’s *Lost In Translation*, where ‘global’ actors (or better: Americans)

community (Naylor et al., 2003), whose very existence appeared as the epitome of parochialness, evidently become part of a health crisis of global proportions. Microbes no longer remain confined to remote ecosystems or rare reservoir species, for them, the earth has truly become a Global Village. These circumstances highlight the importance of taking into account global forces that connect diverse and disparate ecosystems and social systems when investigating questions related to the spatial diffusion of the SARS virus.

In light of what has been reviewed above, we posit that there is a direct connection between global city formation in Toronto and the way in which SARS has affected the city. Travel between the major economic and cultural centres of the modern day global network has significant implications for understanding the spread of emerging diseases such as SARS. Central to this understanding is the relationship between the global city network and microbial traffic. This includes, for example, questions such as: how has the global city network altered the worldwide distribution of pathogens and what does this mean for the fight against diseases such as SARS in particular global cities? Several pertinent questions arise from this with respect to the relationship between the epidemiological trajectory of SARS and nature of the global cities network: What if any are the relationships of a global city's roles in the global economy with its vulnerability to the spread and emergence of specific infectious diseases, in this case, SARS? What are the travel patterns of selected global city communities and how did these contribute to the spread of disease? How are these (globalized) travel patterns linked to the (localized) everyday practices (religious, sexual, communal, etc.) in select migrant communities in Toronto? How has the globalization, incipient privatization, deregulation and neoliberalization of health care services in Toronto affected the ways in which the outbreak

are desperately trying to find humanity in a world commercialized and alienated to the extreme, is a good example of the tension here between global network space and human (re)production.

was dealt with? What are the public perceptions in specific global city communities with regards to health, disease, health care, etc.? Furthermore, what implications does public risk perception have for better risk communication in a diversified global city context? What were the stated policies of globally active corporations and other organizations during the SARS crisis? What was the economic impact of the SARS outbreak of 2003 in Toronto on the city's 'global' industries, most notably tourism, air transport, knowledge and culture, etc.⁶

Global Cities and Infectious Disease

'World cities' (Friedmann and Wolff, 1982; Friedmann, 1986; 1995; Knox and Taylor, 1995; Taylor, 2004) or 'global cities' (Sassen, 1991; 2000; Brenner and Keil, forthcoming) are the command and control centres of the global economy. They are crucial nodes where capital, human resources, information, and commodities are produced, exchanged and consumed (Smith and Timberlake, 2002), and they articulate regional and national economies into the new international economic system: global cities are spatial articulations of the international flows that constitute the global economy (visualized by maps in Friedmann, 1986; Keeling, 1995; and <http://www.lboro.ac.uk/gawc/citymap.html>). Global urban interconnections have been debated and studied through a variety of lenses involving international finance, business services, intellectual exchange, human migration, political re-scaling, etc. Hierarchies and clusters of world cities have been found to be the skeleton of the new world economy (<http://www.lboro.ac.uk/gawc/>). We have discussed Toronto's global city status in Canada in Ali and Keil, forthcoming. Suffice it here to say that Toronto, through its strongly globally and continentally oriented regional production of goods and services articulates the Canadian

⁶ We are at the beginning of an empirical study of the actually existing connectivity of Toronto based and modeled on methodologies developed in the GaWC project (Taylor, 2004). The results of the analysis will then be used to develop more sophisticated measures to monitor the spread of new viruses through cities in the global city network.

economy with the global economy (Todd, 1995; Sassen, 2000; Kipfer and Keil, 2002; Keil and Kipfer, 2003).

While some work on environmental problematic in globalizing cities has been done (for reviews see for example Keil, 1995; Desfor and Keil, 2004; Ng and Hills, 2003), global city research has not paid much attention to the globalization of disease through the new urban interconnectivity despite Friedmann's warning that failing to implement health and environment policies in global cities will have results that "are measured in terms of sickness, death, energies drained, time lost and a relentless assault on the senses" (1997: 22). To our knowledge, no systematic connection between the literatures on global cities and infectious disease in particular has yet been made in the literature (for exceptions see the work done by Victor Rodwin and colleagues, who have studied health related issues in world cities London, New York, Paris, Tokyo but have not explicitly focused on the network connectivity of these cities, e.g. Rodwin and Gusmano, 2002). We therefore propose a combination of theoretical work on cities in a global age and empirical research on urban governance in a time of a severe health crisis. We wish to contribute to the understanding of how pathogens interact with economic, political and social factors to represent a threat to human development and society in an increasingly globalized world. It is in the centre of this inquiry to find out how the rise of newly emerging and resurgent diseases (Heymann and Rodier, 1997; Garrett, 1994b; Price-Smith, 2002; Wilson, 2001; Cohen, 2000; Mayer, 2000, Pedersen; Institute of Medicine, 1992; 2003) is influenced by political and economic power at a variety of scales, ranging from the transnational down to the household and individual levels (Brenner, 2001; Keil and Brenner, 2003; Purcell, 2003; Howitt, 2003; Swyngedouw, 1997; Smith 1992; Marston, 2000; Herod and Wright, 2002; Sassen, 2002). As such, we contend that a serious and scholarly investigation of the global city dimensions of SARS will enable better management of future outbreaks of

emerging disease by ensuring that detection, monitoring and response strategies are compatible with the current political, social, economic and ecological developments unfolding within our increasingly complex world.

On the basis of what we have reviewed here in terms of increased technological, social and ecological connectivity, the inference can be drawn that the connectivity of a specific city global city does indeed represent a critical factor associated with an increased vulnerability of individuals and communities to infectious disease in the contemporary setting. What we need more research on is to what degree these cities (and their inhabitants) contribute to the spread and intensity of diseases or if the global cities network is just a more efficient disease vector? A preliminary answer to this question lies in the nature of the network itself: is it a rather rigid grid of hierarchical economic relationships or a fluid network of topological relationships? For now, we tend to assume – on the basis of work done by Amin and Thrift (2002) and Olds and Yeung (1999) Dicken, Kelly, Olds and Yeung (2001) – that there are distinct globalized actor networks that constitute what we commonly refer to as the global economy. These networks (a combination of technological, economic and socio-cultural relationships) are susceptible to vulnerabilities that are often overlooked in technology or economically based representations of global hierarchies. As Amin and Thrift have argued, cities are “sites in spatially stretched economic relations” (2002: 63). They call the city perceptively “a dense ecology of presence” (ibid.’ 70). In what follows, we explore the relationship between the globalized actor networks and the diffusion of the SARS coronavirus.

The Global City Network and Microbial Traffic International Travel and the “Scale-Jumping” of the SARS virus.

The boundaries and structures of the global ‘network society’ (Castells, 1997) are more fluid than those of traditional societies. ‘Splintering urbanism’ has been used to describe the unequal socio-spatial realities that comes with this (Graham and Marvin, 2001). Some have begun to understand this globalized world in a distinctly ‘scaled’ hierarchy of spatial, state and economic relations (Brenner, 2001; Smith, 1993; Swyngedouw, 2000). Others have noted a de-distanciation of the human existence that is decidedly non-scaled or linear but rather characterized by a ubiquitous “politics *in place*” where actor networks and decentralized politics are at work (Amin, 2002; Amin and Thrift, 2002; Magnusson, 1996). Although perhaps not apparent at first sight, these perspectives have implications for the spread of disease. For an infectious disease to spread, the agent and host must coincide in time and space. This becomes complicated in the contemporary globalized world because both time and space have become “compressed” (Giddens, 1990; Beck, 1999; Harvey, 1989). In this light, we contend that the relationship between globalization and the “microbial traffic” of the SARS pathogen is crucial to understanding disease diffusion. As alluded to above, the notion of “traffic” was first introduced by Morse (1993) with reference to viruses, but the concept was extended by Mayer (2000) to refer to several aspects associated with the movement of pathogens, namely: cross-species transfer, spatial diffusion, pathogenic evolution and changes in the human-environment relationship. Emerging diseases have been commonly defined in three ways: those whose incidence has increased in the last two decades; newly appearing diseases; or diseases that are spreading to new geographic areas (Heymann and Rodier, 1997; Garrett, 1994b; Price-Smith, 2002; Haggett, 1994). It is the latter aspect that is of interest here because it raises the important question of how does an emerging pathogen

become established in human populations in a globalized world/global cities network? The extent of international travel between global cities is important because a disease may be present in nonepidemic form for many years until environmental, structural or behaviour changes allow for its spread into epidemic form (Ali,2004). Contextual knowledge of patterns of human movement and transportation are essential to understanding disease outbreaks and lead to questions such as : How are these movements integrated into the particular forms of social organization (i.e. networks of global cities and connections between rural areas and global cities)? How is this social organization related to disease patterns (Sassen, 2002; Smith and Timberlake, 2002; Keeling 1995)?

Population travel flux and the international movements of passengers has accelerated over the last few decades and global cities have served as nodes in the network (Keeling, 1995) As a consequence, disease dissemination has been exacerbated (Price-Smith, 2002). The rapid growth of large cities has created “disease pools” that allow new pathogens to emerge and flourish (Hagett, 1994). Flights themselves constitute a problem: Tightly sealed aircraft cabins serve as an ideal setting for the rapid dissemination of pathogens particularly on longer flights (Garrett, 1994a). The increasing size of modern aircraft raises the probability of having an infected person on board, and the number of potential contacts increases (Haggett, 1994). A total of 16 people became infected with SARS on 35 flights (Associated Press/Reuters, 2003). Brief stopovers for connecting flights as well as the seasonality of emerging infectious pathogens further complicate matters. The latter may be especially important in the case of SARS, a member the corona virus family that is primarily transmitted through respiratory droplets and has an estimated incubation period of 2-10 days (WHO, 2003b).

It will be useful to review the emergence of the world city network , because, as we have argued, this network helps establish the parameters of the changing world in which both humans and viruses co-habit. The concepts that underlie world and global city theory were originally derived from a critical reading of world systems theory (Friedmann and Wolff, 1982; Friedmann, 1986, Ross and Trachte, 1983). In more recent work, this framework has been extended and further elaborated upon as recent work on space, scale, networks and topologies moved to the fore. While at first, most world city research looked at global cities as instances or nodes of global flows and streams of capital, culture and people (King, 1992), more recent work started to look specifically at the formation of world cities through local political, economic, ecological, social and cultural agency (Keil, 1998). In addition, even erstwhile architects of the intellectual construct of the world city network, have begun to specifically take into account that global cities are “sub-national places where multiple global circuits intersect and thereby position these cities on several structured cross-border geographies, each typically with distinct scopes and constituted in terms of distinct practices and actors” (Sassen, 2003: 4). While Sassen has pointed out that current globalization processes are multi-scalar, she has also argued that they may not follow “the model of a nested hierarchy” and that there are possibly more complex processes at work than expressed in notions of scalar hierarchies. This particular point has been strongly expressed also by Amin and Thrift (2002; Amin 2002), who have argued for a topological rather than a scaled hierarchical view of global urbanism. In a recent paper, Amin, for example, has argued that “overlapping near-far relations and organizational connections that are not reducible to scalar spaces” have to be taken into account (2002: 386). Amin further describes cities as “places in nonterritorial terms, as nodes in relational settings, and as a site of situated practices” (Amin, 2002: 391). This topological view is moved into the global city context in a recent paper by Richard G. Smith, who has argued – based on Thrift (1998) – for a revision of the “scalar view

of globalization and world cities” as embraced by Sassen and other political economists (Smith, 2003: 562). In this revised view, Smith pursues a reading of world cities as “polyrhythmic”: “a liquid theatre alive with the unruly times of urban practices” (2003: 562). In our own work, we are building on both, the scalar, networked hierarchy of the original world city literature and on the newer, topological view espoused by Smith, Amin, Thrift and others. In fact, we would argue that world cities are both: relatively fixed network nodes, bounded, historical, path-dependent, rooted in national, regional, but also diasporic historical geographies; and they are fluid, autonomous, self-producing, autopoietic, “interactive and constantly in process” (Thrift, quoted in Smith, 2003: 562). This double character is a necessary condition of the global city as it needs its spatial and temporal fixes as it melts and reforms daily, hourly, even by the minute. It is the dialectic of mobility and fixity that is truly characteristic of the urban condition. One without the other is impossible, particularly in global cities and as we shall see, it is this intrinsic dynamism that needs to be taken into accounts of disease diffusion in contemporary times.⁷

In light of the above, let us look briefly at the specific merit of Smith’s “world city topologies” for our research on infectious disease in the world city network. Smith muses about the case of the 19th century Siamese-twin girls ‘Ritta-Christina’, who contemporaries had problems defining or identifying as boundaries were difficult to draw either between or around the two/one. In extension, he then asks: “What would cities be like if we were to think of them as no more than the undefined middle of a continuum?” (2003: 570). Smith elaborates and explicitly rejects the political economy language of “nests of scales” and “boundaries” and suggests that such “a discourse of scalar and territorial relativization stems flow, and so is antithetical to a topology of circulation and network folding” (2003: 571). In a set of diagrams,

⁷ The authors have benefited from conversations with Michael McMahon in developing this argument.

Smith then sets forth to explain the novelty of his thinking and concludes: “Cities here are hybrid and porous translocal sites that are criss-crossed by the multiple lines of networks that are more or less long and more or less durable” (Smith, 2003: 572). He ultimately declares the geography of Sassen to have “melted” in the face of such hybrid porosity. We think it is premature to make the latter declaration as it seems that it is exactly the reliable, relatively fixed, predictable and efficient scaled network quality of the global geographical system (of which global cities are an important part) that allowed the other characteristics of the network – the unpredictable, porous, hybrid qualities – to flourish. The SARS virus needed the markets, trains, housing complexes, hotels, conventions, churches, hospitals and other institutions to travel. It needed the political economy of the global city network in its scaled hierarchical spatiality to spread. Moreover, and we will explore this in detail elsewhere, the scaled hierarchies of the spatialized communities of the health systems between China, Hong Kong, and Toronto, threw up formidable obstacles into the way of the virus and contained it imperfectly, slowly, with major problems, but eventually contained it through one of the most fixed, spatialized, and restrictive measures possible: the home quarantine. The spread of the SARS virus is therefore at once reliant on the predictability of the techno-social infrastructures of the global cities network and on the unpredictability of the human and natural subjects that populate its actor networks.⁸

As an urban phenomenon in Toronto, the spread and reactions to SARS were directly linked to the emergence of new modes of social regulation, new technologies of power and new coercive measure often identified with the neoliberal state. As local states have limited autonomy and no sovereignty, their strategies of control and regulation are limited to a range

⁸ For illustration see the images in Smith, 2003 and a diagram depicting the spread of the SARS virus in Toronto produced by the *Toronto Star*, which can be viewed at

of options. One of these strategies is the imposition of spatial controls (always in tight lockstep with higher levels of government). With these measures, the local state counteracts the destructive and potentially devastating consequences of heightened vulnerability. These spatial strategies aim predominantly at the control of individuals: the bodies of specific urban inhabitants, tourists and travelers. We conclude by considering the implications of such control measures with reference to the SARS outbreaks in Toronto.

Conclusions: Spreading insecurity – the virus in the global city

Fighting infectious disease is always tied up closely with spatial strategies of control, particularly linked to the use of urban spaces. Historically, disease has been hoped to be confined through ghettoization of infected populations, along with their often racialized or otherwise marked segmentation from mainstream societies. There are basically two kinds of segmentation possible: expulsion or ghettoization. As Wacquant noted based on Richard Sennett's historical studies of the Venice ghetto that the forced ghettoization of the town's Jews in the confined space of an old foundry in 1516 by the Senate of Venice was "designed as an alternative to expulsion to enable the city-state to reap the economic benefits brought by the presence of Jews (including rents, special taxes, and forced levies) while protecting their Christian residents from contaminating contact with bodies perceived as unclean and dangerously sensual, carriers of syphilis and vectors of heresy, in addition to bearing the taint of money-making through usury which the Catholic Church equated with prostitution (Sennett, 1994; Wacquant, 2003:).⁹ It is necessary to note that most of the ways in which we view

<http://www.thestar.com/NASApp/cs/ContentServer?pagename=thestar/Render&c=Page&cid=1049194989222> under the heading Trail of errors: Tracking Toronto's SARS deaths.

⁹ Ironically, of course, increased institutionalization – contributes to the spread of infectious diseases (e.g. jails and hospitals) – medical practices and population density/proximity within these spaces. During the Toronto SARS crisis, this relationship of institutionalization and disease was evident (Garrett, 1994: 317-8).

infectious disease have a clear geographical dimension. Craddock has remarked, though, that “the role of space in political and symbolic ascriptions of feared diseases to the socially marginalized, and the role of disease in shaping urban topographies and the production of place” have been largely unexamined (1995: 957). We will take this point up again when we discuss the specific quarantine measures employed during the Toronto SARS crisis. Our own interest here lies squarely within the parameters set by Wacquant and Sennett above: how are connections made between the control of populations who are real or perceived carriers of disease, their residence and their economic utility for the system. As we will show below, the interaction of local/global economic interests, domestic/foreign health concerns and race/residence concocted a brew of victimization that proved positively uncomfortable and potentially dangerous to the Asian community in particular and the entire fabric of Toronto multiculturalism on the other.¹⁰

Toronto is tied into an increasingly diverse global network of diaspora and migrant cultures at the base of Toronto’s hybrid globality (Goonewardena and Kipfer, 2004). The connection between the globalizing political economy and the cultural and demographic changes it brings with it is crucial to understanding the kinds of issues at the centre of our proposed research on SARS in Toronto. We believe that the research on origins and spread as well as treatment of the disease will benefit from a better understanding of the everyday practices and socio-cultural interactions that characterize today’s world and more specifically the everydayness of global cities (Flusty, 2003; Keil, 2002; 1998). The everyday fabric of multicultural Toronto was tested by what came to be referred to, in the summer of 2003, as the ‘new normal’, a state of constant awareness of the risks and vulnerabilities of urban life, which were – to an increasing

degree under the neoliberal regime of the day – downloaded to individuals and their communities (Keil and Ali, 2004). When assessing the spatial strategies with which the local state encountered the SARS epidemic in Toronto, we can learn from historical example. Susan Craddock has looked at smallpox infection in relation to the Chinese population in 19th century San Francisco. She writes: “Chinatown was considered an extension of the Asian ‘threat’ into the boundaries of the city, and these shifting perspectives on smallpox were inextricably intertwined with increasingly negative perceptions of this city within the city” (1995: 962). This important observation lays down a certain pattern, which is both universal and specific in time and space. Toronto, for example, has three Chinatowns (both residential and commercial) and a smattering of Chinese populations in the rest of the city. Toronto’s Chinatowns are a far cry from the immigrant ghettos of the 19th century. Yet the pattern remains: the perception of vulnerability of the entire urban region to problems such as infectious disease is refracted through specific social and spatial communities. In the case of SARS, it was the Chinese communities and their residential and commercial neighbourhoods that were stigmatized and held responsible for the spread of disease. Chinese restaurants and shops suffered immediate and long-lasting economic consequences (Leung and Guan, 2004). Since the postmodern, and partly suburban Chinese enclaves of Toronto are not as easily defined and its populations are not as easily contained as historical ghettos and their residents, the task of devising a strategy to contain disease associated with these places and their people cannot possibly be easy (let alone desirable and advisable). Similarly, the movement of people into and out of these places and communities was unmappable after they left the prescribed pathways of international air travel and disappeared into the capillary system of the urban region. To return briefly to Susan Craddock: “The coded meanings – and spatialization – inherent in responses

¹⁰ No doubt there is an even more complex history of segregation at work here if we include race, sex, colonialism, urbanization, modernity and contagious disease here. Howell’s case study of the regulation of prostitution in Britain and the British Empire in the 19th century has much to offer in this regard (2000).

to diseases must be uncovered in the 'density of the social fabric', not just the surface" (1995: 967). In Toronto, any "symbolic mapping" (Craddock, 1995) of the spread of infectious disease in and through urban communities will have to take into account the wild unpredictability of the topology of the global city.

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