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Vis Medicatrix Naturae in the Modern Landscape: Time for a Change in Naturopathic Education and Practice?

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Just a shade over one century ago, famed biologist Sir John Arthur Thompson delivered the keynote address at the annual meeting the British Medical Association. The title of Thompson's much-anticipated talk was *vis medicatrix naturae*.¹

As he opened his talk, he acknowledged that there are many ways to interpret this ancient Hippocratic phrase, including the most common explanations wherein it refers to the innate healing abilities within organisms, and the healing virtues that can be derived from natural substances. Thompson, however, had a very specific interpretation:

"What, then, do I mean tonight by the healing power of nature? I mean to refer to the way in which Nature ministers to our minds, all more or less diseased by the rush and racket of civilization, and helps to steady and enrich our lives."

Over the course of his lecture in July 1914, Thompson methodically presented his argument that modernization and the conditions associated with urbanization were eroding an evolutionary-rooted layer of resiliency that otherwise protects against psychological distress and chronic disease. In his view, the "*very potent vis medicatrix naturae*" afforded by acquaintance with all aspects of nature - from stars in the sky, to the sounds of the ocean - was being weakened by lack of opportunity. Diminished access to *experience* nature. Therefore, the health problems associated with crowded, noisy, built environments and other factors of urbanization were being compounded by the loss of mindful contact with biotic and abiotic aspects of natural environments.

Allostatic Load, Postal Codes and Health

Today, Thompson's keynote address is arguably more relevant than ever. It is now abundantly clear that residential environments within North American Postal/Zip Codes can be a major determinant of health outcomes. Many non-communicable diseases (NCDs), including mental disorders, are not distributed randomly in the population. There is a well-defined socioeconomic gradient wherein the highest burden of NCD is carried by the most disadvantaged groups.² Obviously there are many factors that might help explain the non-random distribution of disease and health inequalities,

otherwise known as the health gap. Collective exposure to social, physical (e.g. pollution), and psychological stressors can manifest in physiological wear and tear known as allostatic load (AL).²

As NDs know well, AL theory allows for an understanding of the ways in which chronic stress can lead to disease. Environmental pressures set in motion a series of compensatory physiological responses - neuroendocrine, cardiovascular, immune and others - that over time can compromise the structure and function of bodily systems. Healthy lifestyle habits are associated with lower AL, while on the other hand, AL itself can compromise mood. Perhaps not surprisingly, markers of AL such as low-grade inflammation and oxidative stress are documented to be higher in neighborhoods with high levels of socioeconomic deprivation.²

There is little doubt that in certain neighborhoods, the odds are stacked against the adoption of healthy lifestyle habits. Many of these areas are primary zones of grey space - i.e. top-heavy with industrial and commercial activity, major transportation routes, bars, liquor stores, convenience stores, fast-food and tobacco outlets. These features, along with visual marketing - e.g. billboards, sidewalk signage, targeted screen media delivery - further encourages the maintenance of unhealthy lifestyle choices such as fast-food consumption and tobacco use.²

Environment shapes behaviour. Consider that in urban environments, as much as 31% of the variance in excessive fast-food consumption may be due to residential density of fast-food outlets in urban settings.³ Residential proximity to billboard advertising of snacks and sweet drinks is associated with decreased daily fruit or vegetable consumption.⁴ We shouldn't be surprised, therefore, that brand name logo recognition of major fast food outlets is significantly higher in children from disadvantaged neighbourhoods.⁵

Although it is difficult to paint every North American metro region with the same brush, socioeconomic disadvantage often translates into higher exposure to environmental toxins and noise. The living environment is often much more crowded and the disadvantaged are more likely to contend with physical stressors such as extremes of heat and cold². Blood levels of carotenoids and other markers of healthy dietary patterns are often lower.^{6,7}

Natural Environments

Natural environments are defined as those that are *relatively* unchanged or undisturbed by human culture. The presence/absence of trees, bodies of water and other aspects of natural environments

within various scales of 'neighborhood' is not only related to perceptions of health, it is connected to many non-communicable disease (NCD) risks. These include cardiovascular disease, cancer, Type II diabetes and mental disorders. These associations have been reviewed in detail elsewhere.^{8,9} However, the ability of natural environments to narrow the health gap is worth highlighting. In this sense, natural environments are considered 'equigenic' environments.

A landmark study by Richard Mitchell and colleagues examined land-use data in all major cities in the United Kingdom; they found that low income and low residential-area green space was associated with cardiovascular mortality rates twice that of high socioeconomic areas. However, when examining the combination of low income and high levels of residential-area urban green space, the gaps in mortality rates became narrowed.¹⁰ Recently, Mitchell and colleagues reported that the usual socioeconomic inequality gap in mental well-being in 34 European cities was 40% smaller (narrower) when respondents reported good access to green/recreational areas. The author did not mince words:

"If societies cannot, or will not, narrow socioeconomic inequality, research should explore the so-called equigenic environments - those that can disrupt the usual conversion of socioeconomic inequality to health inequality. This large, international, observational study suggests that access to recreational/green areas may offer such a disruption."¹¹

Prenatal and early-life stress can induce epigenetic changes that may influence lifetime risk of NCDs.^{12,13} In that context, remarkable connections between higher levels of residential greenness and healthy term pregnancies have been noted. For example, a recent examination of birth outcomes in Vancouver (even after controlling for air pollution, noise, walkability, and distance to the nearest park) showed that greenness within 100 meters of the home is associated with healthy term birth weight and reduced likelihood of preterm births.¹⁴ The implications of these findings are obvious.

It is also worth noting that green and grey spaces may overlap in the ways in which they might influence lifestyle behaviors for better or worse. Living closer to urban green space and greater park access is associated with healthier dietary habits (e.g. more fruits, vegetables, nuts/beans, and less fast-food, processed grains, sodium-rich food and sugar-rich beverages) and lower insulin resistance. On the other hand, in socioeconomically disadvantaged neighborhoods, lower levels of open space for physical activity have been linked with greater density of fast-food outlets.¹⁵⁻¹⁸ Again, grey space isn't increasing the odds of adopting healthy lifestyle habits.

Psychological Mechanisms

Large scale epidemiological studies have certainly helped support the argument that green and/or blue space around one's residence is an important public health consideration. Obviously, it is important to understand how and why certain environments might be conducive to the promotion of health. It is easy to explain the value of natural environments via increased opportunity for physical

activity and social interaction. Indeed, there is research to support this contention.^{8,9} However, there is also research indicating that some other factors might be at play, including Thompson's idea of reduction of psychological stress.

A variety of laboratory and field studies have demonstrated that viewing scenes of natural environments, or walking within natural environments (vs. viewing images of, or spending time in urban built environments), can improve mental outlook and cognitive functioning.^{8,9} Often, these findings are explained by the complementary psycho-evolutionary stress recovery theory (SRT) and the attention restoration theory (ART). SRT argues (as Thompson did) that several million years of evolutionary experiences within natural environments have primed us to be better adapted to such settings. Spending time in nature fosters positive emotions, which of course would diminish the burden on stress physiology.

ART proposes that natural environments are cognitively restorative because they are inherently *fascinating*. Natural settings support automatic engagement of attention (involuntary attention) in ways completely divergent from the purposeful attention required in modern urban streets or work environments. Activities in the latter environments place a heavy tax on the executive system.

Physiological Mechanisms

The differences between urban built and natural environments are far more than visual; researchers are turning their attention to what might be in the air within natural environments, including chemicals released by trees. Natural environments place one in contact with a host of plant-derived airborne chemicals; known as phytoncides, these chemicals have been an area of interest in Japanese natural environments research for many years. For the last 25 years, the study of *shinrin-yoku* — translated from Japanese as forest-air bathing — involves an understanding of the physiological effects of the "*components emitted from the forest*".¹⁹

In addition to phytoncides, the air within natural environments presents with relatively higher concentrations of negative air ions and non-pathogenic microbes. In particular, experience with non-harmful microbes may be a critical pathway to help explain some of the long-term benefits of natural environments, especially in early life. Full discussion of how non-harmful microbes in the external environment may promote health is beyond the scope of this Editorial; the reader is referred to an expert, open access review by noted microbiologist Dr. Graham Rook.²⁰

Nature Relatedness

Canadian psychologist Elizabeth Nisbet is a leader in the field of nature and health. She and her colleagues have developed an easy-to-use scale to determine the extent to which an individual might be connected to nature.^{21,22} Known as the Nature Relatedness (NR) scale, higher NR (and other similar measurements of nature connectivity, nature connectedness) scores have been connected to mental well-being, vitality and life satisfaction.²³ The NR

scale captures the degree to which someone has an awareness and understanding of the natural world — fascination with, interest in, and desire for nature contact. The NR-6 is a simple 6 question scale that has been validated in recent research.

There are numerous ways in which the NR and NR-6 scales could be used by naturopathic clinicians and researchers. Some evidence suggests that NR can be cultivated, and since it is so highly associated with health, that could be an important consideration. Does baseline NR (or changes in NR) correlate with or influence clinical outcomes? It would also be interesting to know if individuals drawn to the naturopathic profession score higher in NR, or if NR scores change over time through the 4-year naturopathic program.

Naturopathic Education and the Oath

Thus far in this editorial I have remained mostly detached from the research-based discussions on built and natural environments. Please allow me to shift gears a bit, first by acknowledging the Canadian Association of Naturopathic Doctors for deciding to take on the topic of healthy environments in these pages, and second for allowing me the privilege of making a contribution. The CAND has opened the door to subject matter that transcends health geography *per se*. These are discussions that are, or should be, at the core of naturopathic medicine; they are discussions of biodiversity, climate change and the health of the planet itself.

There is a highly complex, yet evidence-based body of research that has been served up by disciplines ranging from anthropology and ecology, to landscape design and therapeutic horticulture. Although this research sits well within the domain of naturopathic medicine, it remains largely untouched within the four-year academic programs. In the era of environmental degradation, biodiversity loss, urbanization and anthropogenic climate change,²⁴ we should all find that to be unacceptable.

I would argue that we — the profession — should be cultivating leaders in this field, clinical awareness, and a confidence within graduating ND students such that they have a full grasp of how important natural environments are (to self, patient health, community, and pressing global issues). Sadly, it is often assumed that NDs already know this information, and that it is too simple. It's time to wake up out of that slumber of academic naivety and disconnect. Environmental determinants of health are far from simplistic — yet they are crucial discussions when considering that sustaining human health is ultimately dependent upon biodiversity and environmental sustainability.

Science drives policy and practice, and without such critical research, perhaps that planned urban park will be a parking lot instead. Patients, too, want guidance. Exercise in nature you say. How much, for how long, where, does time of day matter? Are certain natural environments more conducive to health promotion? Are there some design aspects within parks that could actually compromise the expected stress reduction? Does nature relatedness matter to the prescriptions? Research suggests that it all matters.^{25,26} This, of course, does not preclude generalized advice and engagement with

incredibly important public health projects such as the David Suzuki Foundation's annual 30x30 Campaign to get Canadians outdoors.

Still, from a professional perspective we need a paradigm shift. Conventional medical programs are not sitting back assuming that students already understand the urgency and clinical relevancy of these connected topics. They are already ratcheting up their efforts to educate the “physician of the future” — i.e. a medical doctor fully informed on the issues of biodiversity loss, urbanization, climate change and other issues of environmental degradation, and how these impact health.^{24,27} In April, 2015, the United States White House Press Secretary announced that the Administration is gathering the top academic leaders in medicine to “ensure that the next generation of health professionals is trained to address the health impacts of climate change”. In a recent commentary in the *Canadian Family Physician*, it was stated:

“Some physicians shy away from engaging with wider social issues, focusing instead on the individual patient. However, when it comes to action on climate change, such a position becomes untenable given that many of the measures that could mitigate harmful environmental effects would also be of direct benefit to individual health.”²⁸

The naturopathic profession needs to gather its collective, *educated* voice. The time is now for an environmental naturopathy course, one that can easily be blended into the early academic calendar within the theories and philosophy of naturopathic medicine, and again in clinical relevancy during the latter parts of the program. A required course *must* be built into each of the programs accredited by the Council of Naturopathic Medical Education. Lack of awareness concerning the seriousness of this topic will place the profession far behind in the very category in which it could excel!

We also need to ensure profession-wide accountability on this topic through questions that appear on NPLEX clinical examinations within the current domains of health psychology and research. Given the existing wealth of research on the environmental determinants of health, it seems strange that there is so little in the way of academic instruction and examination accountability. Graduating NDs need to understand both the environmental toxins that they read and hears so much about, and the other environmental variables, those that work *for* the promotion of health.

In closing, it might be worthwhile to recall the Naturopathic Oath, with its dedication to “Act in Cooperation with the Healing Power of Nature”. I'd like to think that oath involves a commitment to *Vis Medicatrix Naturae* as Thompson viewed it; however, the only way to ensure that graduating NDs understand the full scope of the oath is to provide proper academic preparedness. The naturopathic profession cannot stand idly by, resting on its self-perceived academic and professional laurels — personal, public and planetary health is on the line. In this issue of *Vital Link*, the CAND has opened the door to a new direction (or an old one, depending on the view) in the education and professional practice of naturopathic medicine. 🍁

About the Author

Alan C. Logan, ND is a graduate of CCNM. For the last decade he has presented research on natural environments within courses offered at Harvard's School of Continuing Medical Education. He contributed to Harvard School of Public Health's recent Natural Environments Initiative position statement, and is a co-author within the upcoming Oxford Textbook of Nature and Public Health (Oxford University Press).

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