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Introduction

Natural Science in the New World: The Descriptive Enterprise

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For much of Canadian history, most of the science that took place in Canada took place within the bounds of natural history, and it was primarily the study of natural history that inserted Canada into the consciousness of Europe. Long before science was institutionalized in Canada, early naturalist-explorers scoured the landscape, studying minerals, plants and animals, as well as human artifacts, in quest of commercial, scientific, or military uses. Stories and samples of diamonds, gold, copper, and other metals, or the ‘vegetable gold’ of ginseng or even mast trees, provoked royal and commercial support for further voyages of exploration and conquest. Back in the metropolis, whether Paris, London, or Madrid, disputes over the exact nature of these mineral or botanical specimens reflected the controversies between alchemists, doctors, herbalists and natural philosophers, and revealed the fault lines of the scientific revolution. The minerals, plants, animal skins and parts, curiosities, even live specimens, including those unfortunate Aboriginals imported to European courts in the early years of exploration, provoked debate and controversy in Europe not only about the nature of the New World, but also about how the natural world was known. Linnaeus, in a famous aphorism (‘America, 1492’), asserted the significance of the discovery of the New World that, in essence, made everything new, and it was the flood of new specimens and new observations that forced European naturalists to revise their speculations on the classification of nature. The newly emergent discipline of natural history was, according to

Paula Findlen, “perhaps the most widely discussed and hotly debated discipline among Renaissance natural philosophers.”¹

Thus, the discovery of Canada and the development of natural history occurred simultaneously, and the two reinforced one another. The descriptions and objects brought back from Canada by the Corte-Real brothers, by Jacques Cartier and his chronicler André Thevet, among others, helped to fuel the renewed investigations into the natural world that so characterized sixteenth-century European scholarship. Scholars and naturalists developed rigorous new techniques for describing and classifying nature, at the same time that they also developed networks of commercial exchange that further encouraged the search for natural specimens. The greater attention to natural objects themselves, the new illustrations of those objects, and the extended networks of scholarly exchange, were the factors that better enabled explorers and settlers in Canada to undertake observations. A Jesuit missionary in China, Pierre Jartoux, had recently provided a detailed and illustrated account of ginseng, which he noted was highly sought-after as a remedy. The Jesuit Joseph-François Lafitau, had not been very long in Canada before he recruited Aboriginal informants to help him locate ginseng in the New World, and his 1718 treatise on North American ginseng initiated a lucrative trade to China.² Though the two plants were not identical, Lafitau believed that they were, since they resembled each other and both Chinese and Iroquois peoples used the plants for healing.

By the seventeenth century, a number of Canadian plant specimens, transplanted to European botanical gardens or preserved in collections, were already well known to European experts. Canadian flora became increasingly represented both in exhaustive international surveys and in local regional studies. A series of Canadian plants was included in an ambitious encyclopedic index of more than six thousand plants described by Caspar Bauhin and published in 1623. Twelve years later, Jacques Philippe Cornut, a physician, published *Historia Plantarum Canadensium*, which described eighty-six plants (only some of them Canadian), that he had studied at the herb garden of the Paris Faculty of Medicine. Many were illustrated with copper plate engravings.³ In the 1690s, the French state commissioned a French physician stationed in Quebec, Michel

1. Paula Findlen, “The Formation of a Scientific Community: Natural History in Sixteenth-century Italy,” in *Natural Particulars: Nature and the Disciplines in Renaissance Europe*, eds. Anthony Grafton and Nancy Siraisi (Cambridge, MA: MIT Press, 1999), 169.

2. Kristin Johannsen, *Ginseng Dreams: The Secret World of America’s Most Valuable Plant* (Lexington: University Press of Kentucky, 2006), 17-18.

3. Victoria Dickenson, *Drawn from Life: Science and Art in the Portrayal of the New World* (Toronto: University of Toronto Press, 1998).

Sarrazin, to gather “the special plants, fruits, and other things which this country produces and which may be useful for the Jardin Royal.”⁴ Much of the new natural history was produced in botanical gardens like the Jardin du Roi in Paris (founded as a medicinal garden in 1626), which amassed enormous collections of specimens from around the globe. Important British merchants and collectors like Sir Henry Sloane and John Tradescant developed their own private collections, but in Britain, in contrast to France, state involvement came only in the 1750s, with the creation of Kew Gardens and the foundation of the British Museum from Sloane’s collection.

Books were another important medium for circulating natural knowledge and they privileged rigorous description and illustration. Brian Ogilvie and Harold Cook have both recently insisted that early natural history was, above all, a science of description.⁵ It was rooted in a new quest for objectivity, that is, for careful understanding of the physical qualities of objects, understood primarily as physical objects rather than as divine texts or human symbols. The passion for precise description was, according to Cook, shared by traders and naturalists alike, and description long remained the pre-eminent scientific mode for approaching New France. European settlement was comparatively slight and European technologies were not adequate to penetrate the dense forests of the Northeastern woodlands or the tundra of Labrador or the ice of the far north. These new regions seemed, to early European explorers, to be shaped and stamped by a surfeit of nature far less amenable to civilization than their own climes. Description was one of the few useful techniques that early inhabitants of New France could wield to parse the wilderness and to advance their settlements. Large sections of the Jesuit Relations, for example, were devoted to answering questions about the flora and fauna that might be transplanted. Paul Le Jeune, writing from Quebec in 1636, reassured potential settlers that grapes would probably grow well, given the evidence of the native grapes. In 1664 Pierre Boucher, who had emigrated to Canada as a child and become a prominent public figure, published a *Histoire véritable et naturelle des moeurs et productions du pays de la Nouvelle France, vulgairement dite le Canada* with chapters on the birds, animals, fish, trees, and wheats of New France, among other topics. In 1672, Nicolas Denys, who lived for many years in Acadia, published a *Description géographique et historique des costes de*

4. Nancy Hudson-Rodd, “Hygeia or Panacea? Ethnogeography and Health in Canada: Seventeenth to Eighteenth Century,” *History of European Ideas* 21, 2 (1995), 242.

5. Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: Chicago University Press, 2006); Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007).

l'Amérique septentrionale: avec l'histoire naturelle du pais. As well as long sections describing the landscape, Denys included chapters on the salt and fresh water fishes, sea birds, trees, animals, reptiles, and fruits. Both books were written primarily to draw settlers to the colony, to persuade them that they could live well there, hunting new and familiar birds and animals, catching familiar fish, raising familiar European crops, and making “bread as beautiful and as white as in France.”⁶ Boucher’s chapters listed the names of the relevant plants and animals; he did not take much trouble to describe them, because the important points were made in the mere recital of names. This was natural history designed to appeal to a broad audience.

What these men and other early observers did describe in considerable detail, was Aboriginal customs. Exotic stories that played up behaviour that writers and audiences found quaint or frightening or scandalous were most likely to circulate widely. Just as the land in New France seemed marked by a surplus of nature, so too were its inhabitants seen to be over-determined by nature. They had better eyesight and sharper senses,⁷ and they were ruled by natural law, rather than by kings or laws or police. Their leaders could exercise only so much authority as their eloquence commanded at a given moment; moreover, their behavior was invariably ascribed to “nature.” When Europeans waged war, they had particular strategic motives; when “Indians” waged war, they were mindlessly following a “natural” bloodthirstiness that Europeans had outgrown. Physically, mentally, politically, socially, Aboriginal peoples were seen to be chained to and defined by nature.

Europeans were also, of course, shaped by nature. The observation of “natural man” in America inspired a sustained reflection upon the extent to which nature or nurture predominated amongst civilized beings. Indeed, one of the leading questions for eighteenth-century naturalists concerned the potential for racial decline in Europeans living in tropical climates. After Montesquieu’s monumental survey of constitutions and laws, *De l’esprit des lois*, was published in 1748 (and translated into English two years later), political theory was influenced by climatic and environmental theories as never before. As well as outlining the political “spirit” immanent in monarchical, aristocratic and democratic rule, Montesquieu explained that environmental and cultural influences (religion, laws, maxims of government, precedents, morals, and customs) exerted

6. Pierre Boucher, *Histoire véritable et naturelle des moeurs et productions du Pays de la Nouvelle France, vulgairement dite Le Canada* (Paris: Florentin Lambert, 1664), 82.

7. Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World* (Chapel Hill: North Carolina University Press, 2006), 241, quoting a 1637 authority on the “Salvages” of Nova Francia.

counterbalancing influences on human nature. Where one cause acted with more force, “the others in the same degree are weakened. Nature and the climate rule almost alone over the savages; customs govern the Chinese; the laws tyrannize in Japan; morals had formerly all their influence at Sparta; maxims of government and the ancient simplicity of manners, once prevailed at Rome.”⁸ Montesquieu further argued that colder climates produced braver and freer peoples, while hot climates produced enervated, lazy, cowardly people who did not defend their liberties.

While this theory suggested some small approval for the Aboriginal inhabitants of North America, the keeper of the Jardin du Roi from 1739 to 1788, the Comte de Buffon, took a different view. As a leading naturalist of his day, Buffon was concerned with the problem of change: what sort of changes occurred to beings and could beings change in their identity over time? Long before naturalists grappled with Darwin’s theory of evolution, they puzzled over evidence of long-term change of species illustrated by, for example, fossil records. Buffon was convinced that animals could transform over time, but only in the sense that they could degenerate. The interior mould that, he theorized, gave them their characteristics could, under the right conditions, produce strong and vigorous animal populations, but under the wrong conditions produce only weak populations. In New France and eastern North America more generally, Buffon argued that under the influence of a cold climate and humidity, nature produced degenerate forms, with far fewer species and smaller animals than those seen in Europe.⁹ North American peoples were similarly degenerated species, he argued: “In the savage, the organs of generation are small and feeble. He has no hair, no beard, no ardour for the female... He has no vivacity, no activity of mind.”¹⁰ If humans cleared the trees, he theorized, then the land might warm up and the humidity evaporate, and North America might yet be capable of supporting an advanced civilization, but under the existing conditions, nature could only be degenerate.

Human weakness made, however, for animal strength. Pliny’s beavers did not built the complex dams of their North American counterparts. Buffon explained that North American beavers had formed themselves

8. Karl Marcus Kriesel, “Montesquieu: Possibilistic Political Geographer,” *Annals of the Association of American Geographers* 58, 2 (1968), 560.

9. Frank N. Egerton, “A History of the Ecological Sciences, Part 2: Buffon and Environmental Influences on Animals,” *Bulletin of the Ecological Society of America* 88, 2 (2007): 146-159.

10. Cornelius J. Jaenen, “Les Sauvages Amériquains’: Persistence into the 18th Century of Traditional French Concepts and Constructs for Comprehending Amerindians,” *Ethnohistory* 29, 1 (1982): 43-56.

into a complex social and political organization because humans were too weak to reduce their vigour, as they had in Europe. The theory also explained how the only North American beaver that Buffon was able to observe first-hand, a lonely specimen brought back to France by an officer serving in Canada, failed to show obvious signs of organised intelligence.¹¹

Thus, though “nature” continued to be the primary point of reference for understanding the land, plants, animals, and people of New France through the eighteenth century, it was a contested category in what continued to be one of the most hotly contested of the scientific disciplines. It was, further, a consequence of the theory that nature ruled over all in North America, that the Iroquois, Anishnabeg, Huron, Odawa, Montagnais, Cree, Mi’kmaq, Innu and other peoples of Canada were unable themselves to contribute to the debate. Native people could be studied by the techniques of natural history, but there were serious obstacles to incorporating their observations and evidence into natural history, as the papers by Chris Parsons and Kristen Greer included here reveal. Because they were ruled by nature rather than culture, Aboriginal people could not have insight into the basic laws of nature that ruled their lives; to do so would have brought them outside of nature. Individual Aboriginal scholars, healers, and naturalists might communicate their insights to local naturalists, but important questions about the nature of nature were thought to be beyond them. Those naturalists who did seriously incorporate Aboriginal categories and knowledge of natural history into their own works were not always the most successful naturalists of their day. Catharine Parr Traill, who settled near Peterborough in Upper Canada, did talk extensively to local Anishnabeg, and she published short pieces of natural history in some magazines. She sent the manuscript of her larger botanical study to well established professors of natural history in Montreal, Toronto, and Kingston,¹² but only managed to publish it after many decades, once her niece prepared colourful and decorative illustrations. Aboriginal bodies could communicate truths to science, but Aboriginal mouths could not speak them. Even into the twentieth century, First Nations peoples from one coast to the other were pressed into service as guides for the burgeoning tourist

11. Buffon’s chapter on the beaver is available online, in the 1788 William Smellie translation, as part of the “Buffon Project” posted by Professor Fran Moran, <http://faculty.njcu.edu/fmoran/beavers.htm> (accessed December 4, 2008).

12. Charlotte Gray, *Sisters in the Wilderness: The Lives of Susanna Moodie and Catharine Parr Traill* (Toronto: Penguin Press, 2000). Traill’s error was perhaps remaining in Canada; Philip Henry Gosse did far better as a writer of natural history when he left Lower Canada and published his 1837 book, *The Canadian Naturalist: A Series of Conversations on the Natural History of Lower Canada*, in London, for a popular metropolitan audience.

and game-hunting industries, but their knowledge of flora and fauna was widely dismissed or rejected as “backwards,” their hunting methods “unsporting.”¹³

Many early settlers in British North America were, like Traill, avid amateur naturalists. Linnaeus’s system of classification had made it possible for anyone, even without special resources or training, to make new observations, while the explosion of popular naturalist publications in the early nineteenth century made it relatively easy to validate and to circulate one’s discoveries. Publishing naturalists universally included within their works the illustrative material that communicated their observations and understandings to an increasingly visually sophisticated audience. These productions glowed with elaborate renditions, often hand-coloured, or later colour-printed, of plants, animals, scenic vistas, and Aboriginal costumes, prepared for lay readers. Such works were also of interest to the growing number of professionals who entered the field in the early nineteenth century, with the founding of universities and natural history societies.¹⁴

Originally, these two institutions reinforced one another. Leading Montreal naturalists figured prominently in both the Natural History Society of Montreal and at McGill University; they included men like Andrew Fernando Holmes and John William Dawson. Holmes had studied medicine in Montreal and Edinburgh; in 1823 he helped to found the first medical school in Montreal (and in Canada), which became the McGill Faculty of Medicine in 1829, where he initially taught chemistry, pharmacy, and botany. In 1827 he co-founded the Natural History Society of Montreal. John William Dawson was an amateur-naturalist-cum-school-inspector who published a natural history of Nova Scotia in 1847. He quickly found employment teaching natural history at Pictou Academy and Dalhousie College, as well as geological survey work, before moving to become principal of McGill in 1855. He introduced a strong science curriculum, and personally taught chemistry, agriculture, and natural history; he also reinvigorated the Montreal Natural History Society and the journal that it published from 1855 on, *Canadian Naturalist*.

13. Patricia Jasen, *Wild Things: Nature, Culture, and Tourism in Ontario, 1790-1914* (Toronto: University of Toronto Press, 1995); Bill Parenteau, “‘Care, Control and Supervision’: Native People in the Canadian Atlantic Salmon Fishery, 1867-1900,” *Canadian Historical Review* 79, 1 (1998): 1-35; Tina Loo, *States of Nature: Conserving Canada's Wildlife in the Twentieth Century* (Vancouver: University of British Columbia Press, 2006).

14. Suzanne Zeller, *Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation* (Toronto: University of Toronto Press, 1987); Luc Chartrand, Raymond Duchesne and Yves Gingras, *Histoire des sciences au Québec* (Montréal: Boréal, 1988); Carl Berger, *Science, God, and Nature in Victorian Canada* (Toronto: University of Toronto Press, 1983)

Similarly, George Lawson made Kingston an important centre for natural history when he began lecturing on zoology, botany, geology, geography, and chemistry in 1858. He too founded a botanical society, a herbarium for the university, and initiated popular lectures. Five years later he moved to Dalhousie University, this time to teach chemistry and mineralogy, but continued to teach and practise botany. Lawson was interested in the distribution of plants, and his studies were inspired by an article by Sir Joseph Hooker, suggesting that Darwinian theory might help to account for plant migrations. French Canadian naturalists were usually trained as priests. Abbé Louis-Ovide Brunet was a local collector who taught botany and dogma at the Quebec Seminary, and then natural history from 1862 on at Laval University; Abbé Léon Provancher published an important *Flore canadienne* in 1862 and a journal, *Le naturaliste canadien*.

The Canadian state offered financial support to universities and even natural history societies, but from 1842 it also began to sponsor its own scientific investigations, under the auspices of the Geological Survey of Canada.¹⁵ Government did not, however, appoint a naturalist to the Geological Survey until 1881, when John Macoun was named Dominion Botanist, as a reward and encouragement for his enthusiastic predictions of agricultural abundance across the Canadian prairies. Other naturalists found other positions in government agencies: William Saunders was an entomologist and farmer who became director of the Dominion Experimental Farms in 1886, and he engaged James Fletcher as Dominion Entomologist the following year.¹⁶ These men were all self-taught naturalists. Fletcher was a parliamentary librarian and Macoun a school teacher who remained, essentially, a collector until his retirement in 1912. Theirs was and remained a science of description and inventory, illustration, and museum collection, all the classic elements of natural history.¹⁷ An exception was Edward Ernest Prince, who was appointed to direct fisheries research in 1893 and who had studied at Cambridge, Edinburgh, and St Andrew's Universities, at the last under W.C. McIntosh, professor of Civil and Natural History and a noted fisheries scientist.

Within a decade or two, university-trained scientists were replacing the old naturalists in all government and university positions. As Stéphane

15. Zeller, *Inventing Canada*; Morris Zaslow, *Reading the Rocks: The Story of the Geological Survey of Canada* (Toronto: Macmillan, 1975); W.A. Waiser, *The Field Naturalist: John Macoun, the Geological Survey, and Natural Science* (Toronto: University of Toronto Press, 1989).

16. Stéphane Castonguay, *Protection des cultures, construction de la nature: L'entomologie économique au Canada, 1884-1959* (Sillery : Septentrion, 2004).

17. On museums, see Susan Sheets-Pyenson, *Cathedrals of Science: The Development of Colonial Natural History Museums during the Late Nineteenth Century* (Montreal and Kingston: McGill-Queen's University Press, 1988).

Castonguay notes, in 1909 the Canadian Minister of Agriculture, Sidney Fisher, dismissed the autodidact candidates that Saunders proposed as Fletcher's successor and instead named Charles Gordon Hewitt, another university-trained scientist, then teaching Economic Zoology and Entomology at the University of Manchester. Rather than amassing collections, the new scientists performed experiments in laboratories and research stations. Their version of nature was one that was dominated by human artifice under carefully controlled conditions.

Francis Bacon, in his early advocacy of scientific experimentation, argued that experiments would "twist the lion's tail," forcing it to yield secrets that could not be observed under normal circumstances. Nature no longer reigned unchallenged in Canada as it had once seemed to do. This is not to say that earlier naturalists had not performed experiments, but experimentalism as a philosophy had never underpinned natural philosophy as it would the new life sciences of the twentieth century. By and large these new biological sciences would be practised in research laboratories far from the public eye and written up in academic journals that commanded professional audiences. There was never a complete divorce between experiment and the old naturalist techniques of collection, observation, description, and cultivation, and there is evidence to suggest that in some respects the new sciences are strongest where they are best informed by natural history traditions. Jennifer Hubbard, for example, suggests that Canadian fisheries scientists failed to predict the decline of the cod in the Grand Banks in part because they had abandoned their old natural-history studies of fish in situ in favour of statistical and laboratory models that proved inadequate.¹⁸ Canadian nature still sometimes defies and eludes the best efforts of western scholarly traditions.

Of course, few historians today would subscribe to a simple nature/culture dichotomy. The nature that visitors to Canada and its inhabitants experienced was always constructed by culture. Greg Mitmann recently described nature as "an outcome, if you will, of an ecology of relations among people, things, and forces at any given historical moment."¹⁹ Reference to nature speaks of certain principles being established, certain futures being prognosticated, certain pasts invoked. It is with the full force of that realization before us that the history of natural history in Canada is being taken up and written about with new energy. History of science in Canada was long an amateur business, done by

18. Jennifer Hubbard, *A Science on the Scales: The Rise of Atlantic Canadian Fisheries Biology, 1898-1939* (Toronto: University of Toronto Press, 2006).

19. Greg Mitman, "Where Ecology, Nature, and Politics Meet: Reclaiming The Death of Nature," *Isis* 97, 3 (2006): 499.

interested scientists or popular historians. Those academic historians who took it up tended to hold ordinary appointments, by national field for example, in history departments. Like the old naturalists, they taught themselves history of science rather than learning it as a special field. This was especially true of the work done in the 1980s, in important studies by Carl Berger, Suzanne Zeller, Susan Sheets-Pyenson, and Morris Zaslow (cited above). But as a new field, established during a period of contraction for many history departments, there was little opportunity for institutional growth. In recent years, historians of science are being produced and hired, and as a consequence, the history of natural history in Canada is expanding once again, infused with new vigour by the expansion in science studies generally, and by the new urgency lent to the field by increasing public concern for the natural environment, its history and its future. Natural history collections, compiled by the great classifiers and the amateurs collectors have been extracted from the cabinets of museums and societies and analysed anew for what they reveal of change over time. Similar efforts have been undertaken with the compilation and analysis of old record books and journals, revealing the changes and constants of microclimates and of species distribution. The new globalization created by the internet has also impelled scholars to rediscover manuscripts and early texts and images, once the preserve of rare book librarians and bibliophiles and now available through museum and library websites, and to include them in their research databases, forcing a revision of old categories of thought and theory, a new 'Linnaean' revolution.

Old and new approaches to natural history were on display at the conference where this volume of *Scientia Canadensis* had its origins. The 16th International Meeting of the London-based Society for the History of Natural History, held in Montreal between September 21 to 24, 2006, was the first time the Society had met in Canada. The Canadian organizers—an interdisciplinary group of colleagues representing a number of important Montreal institutions (McGill University, the Redpath Museum, the Jardin botanique de Montréal, and the McCord Museum)—were conscious of the opportunity the meeting presented to explore all aspects of Canadian natural history from earliest development to the latest research tools. They also recognized that the history of natural science is an innately interdisciplinary field, rooted in practices and competences from both the arts and the sciences, and an important intermediary across what C.P. Snow called 'the two cultures.' In that respect, the symposium attracted not only from scholars in the history of science, but also from those in literature, art and visual culture, sociology, and environmental

studies, as well as from practitioners working in museums, archives, libraries, and botanical gardens.

This rich variety of approaches offered an exceptionally broad survey of the conditions under which natural history was performed, ranging in space from New France to British Columbia, and in time from 16th to the mid-20th century, addressing such themes as the early contact of cultures, the political and practical uses of knowledge, the mechanisms of its circulation within Canada and beyond, and the relationship between amateur and professional forms of knowledge. This variety did not, however, obscure the common threads that ran through the symposium presentations, and that run equally through the history of natural science in Canada. Natural science in Canada began in an imperial context, whether French, Spanish, Russian or British, and this context is central to an understanding of its history. At the same time, imperial science was shaped by the native environment that explorers and naturalists encountered, and most significantly, by Aboriginal knowledge, often misunderstood or misperceived, but nevertheless the indigenous ground upon which European observations were made. If empire and exchange are important threads, so too is the material base upon which natural history has been built. The descriptive sciences rely on a material substrate that can be observed, annotated and illustrated, and findings are communicated as much through the material exchange of specimens, drawings, and collections, as through texts.

The same threads run through the papers assembled for this volume, six of which were presented at the Symposium. The imperial context informs the papers about colonial natural science, whether in New France or in the British Empire. The significance of Aboriginal knowledge is directly addressed in two of these papers. Exceptionally half of the papers are grounded in the analysis of aspects of the material culture of natural history, privileging the illustration as well as the text.

We felt that in organizing the symposium and preparing this volume, we were contributing to what we see as a new and re-invigorated study of the history of natural history.²⁰ Natural history remains at the front lines of the interface between science and society into the twenty-first century and, precisely for that reason, it offers a privileged site for addressing an eclectic audience of natural scientists, social scientists, and the lay public, and for understanding our own role in the natural world, both in the past and into the future.

20. Symposium Organizing Committee: Elsbeth Heaman, History, McGill; Victoria Dickenson, McCord Museum; Ingrid Birker, Redpath Museum; Johanne Landry, Jardin botanique de Montréal.