DOWNLOAD PDF FLORA OF THE HUDSON BAY LOWLAND AND ITS POSTGLACIAL ORIGINS

Chapter 1 : Flora of the Hudson Bay Lowland and its postglacial origins - PDF Free Download

The Hudson Bay Lowland is one of the least populated regions in the western hemisphere, and among the last regions of North America to have its flora and vegetation documented. This book documents native and 95 non-native vascular plants in the context of the distinct geological history and ecology of the area.

Received Aug 20; Accepted Nov This article has been cited by other articles in PMC. Abstract Background Because arctic plant communities are highly vulnerable to climate change, shifts in their composition require rapid, accurate identifications, often for specimens that lack diagnostic floral characters. The present study examines the role that DNA barcoding can play in aiding floristic evaluations in the arctic by testing the effectiveness of the core plant barcode regions rbcL, matK and a supplemental ribosomal DNA ITS2 marker for a well-studied flora near Churchill, Manitoba. Results This investigation examined specimens representing of the species of vascular plants known from Churchill. Sequencing success was high for rbcL: A species was considered as taxonomically resolved if its members showed at least one diagnostic difference from any other taxon in the study and formed a monophyletic clade. Despite incomplete resolution, the barcode results revealed 22 misidentified herbarium specimens, and enabled the identification of field specimens which were otherwise too immature to identify. Although seven cases of ITS2 paralogy were noted in the families Cyperaceae, Juncaceae and Juncaginaceae, this intergenic spacer played an important role in resolving congeneric plant species at Churchill. Conclusions Our results provided fast and cost-effective solution to create a comprehensive, effective DNA barcode reference library for a local flora. Arctic, DNA barcoding, rbcL, matK, ITS2, Species resolution, Climate change, Biomonitoring Background Climate change has already led to substantial modification in the composition of Arctic plant communities [1] as reflected by shifting ranges and genetic differentiation [2]. Many arctic plant species are likely to lose genetic diversity due to their limited dispersal capacity, and consequent range reduction [3], making them particularly vulnerable to climate change. Identifying the impacts of climate change on the composition of plant communities is currently the focus of many studies in the Arctic which employ two main approaches. The first examines the impact of manipulations in light, temperature and nutrient regimes on species composition and richness [4 - 7]. The second approach involves direct examination of plant community composition to identify species that are particularly effective predictors of shifts in vegetation in response to climate change [8]. Both approaches require rapid and accurate identification of plants, many of which lack diagnostic floral or fruit characters at the time of their collection. DNA barcoding employs sequence diversity in short, standardized gene region s to facilitate species identification [9]. Two gene regions from the chloroplast genome, rbcL and matK, have been adopted as the standard barcodes for land plants [10]. Both of these genes have played a very important role in phylogenetic reconstructions for land plants due to their strong phylogenetic signal [11 - 14]. Their capacity to resolve species in local floras has now been tested in many settings, particularly in species-rich tropical communities. As well, numerous studies have tested the additional discrimination provided by supplemental chloroplast trnH-psbA, atpB-atpH, rpoC1 and nuclear ITS markers [15 - 19]. However, in all analyzed cases DNA barcoding has proven an efficient approach for the evaluation of hyper-diverse floras. The nuclear ribosomal DNA region ITS and its two components, ITS1 and ITS2, have been extensively utilized for studies on the molecular systematics of plants because of their high rate of nucleotide substitution and relative ease of amplification, sequencing and alignment [20]. Among the varied supplemental barcode markers, ITS2 shows particular promise because its short length bp and the availability of universal primers make it easy to recover. Although it has been suggested that ITS2 exhibits too much paralogy, and is too susceptible to fungal contamination to be adopted as a DNA barcode marker [21 , 22], it delivered Given this high performance, ITS2 merits serious consideration as a standard marker for plant barcoding. Although plant communities in temperate and arctic regions are much less diverse than those in the tropics [23], they may not be easier targets for DNA barcode analysis because rates of molecular evolution in both plastid and nuclear genomes appear lower in groups of flowering plants with low diversity [24] and in plant species from high latitudes [25]. However, there is some evidence that arctic plant communities have experienced more rapid speciation, due to intense processes of hybridization, refugial isolation and range shifts [26]. The question of how this affects the performance of DNA barcoding for the identification of plant species has seen little investigation. The present study tests the effectiveness of DNA barcoding for the identification of species in the flora at Churchill, Manitoba, Canada. Our decision to work at this locality reflects an ongoing effort to assemble a comprehensive DNA barcode library for all animal and plant species at Churchill. Sequence information was collected for three gene regions rbcL, matK, ITS2 from of the species of vascular plants known from this locale [28 , 29]. Since herbarium collections can aid the rapid creation of comprehensive DNA barcode libraries [30], we compared the success of barcode recovery from herbarium and freshly collected specimens preserved in silica gel. We also investigated factors affecting sequence recovery for these three gene regions in a high-throughput barcoding setting, and adjusted protocols to enhance success. Finally, we compared the success of species identification in this arctic flora with those reported for temperate and tropical floras. Methods Study area The Churchill area lies within the Hudson Bay Lowlands in a region where quartzite and dolomite bedrock has created a wide range of microhabitats. Poor drainage has led to the formation of extensive peat bogs, while broad tidal flats lie along the margin of Hudson Bay. Churchill is positioned in southern hypoarctic tundra with elements of high boreal subzone following along the Churchill River [31], with stable coexistence of oceanic and continental floristic elements [32]. The community of vascular plants around Churchill has been re-established in the years since deglaciation [29 , 33 , 34]. Tissue collection and identification We examined specimens including representatives of species, genera, 51 families, and 24 orders. When available, several individuals per species from different populations were analyzed. The sequences for three barcode markers: Botanical nomenclature We adopted the Checklist of the Panarctic Flora PAF Vascular Plants [40] to alleviate problems created by the frequent lack of standardization in name usage for species with Holarctic distributions. Some generic names diverge from those in the most recent taxonomic treatments for the North America flora [35 - 38 , 41] where Oxycoccus is placed within Vaccinium[42], Cyrtorhyncha within Ranunculus[43], two species of Chamerion are assigned to Epilobium, and Comarum palustre is treated as Potentilla palustris[36]. According to the PAF checklist, 87 of genera in our study were represented by a single species. In brief, small amounts of dry plant tissue 0. The tissue was then ground into fine powder using a Tissue Lyser Qiagen, USA with rack adapters at 28 Hz for 30 seconds; the adaptor was then rotated, and one more round of grinding was applied. Strong amplification of rbcL and ITS2 was obtained with low concentrations of primers 0. Subsequent x dilution of the amplicons enabled direct sequencing without PCR purification. The matK region required higher concentrations of all reagents: We employed two primer sets to aid the recovery of matK. The cycle sequencing reaction and subsequent clean-up employed standard CCDB protocols [53] with products analyzed on an ABI xl capillary sequencer.

Chapter 2 : Identification of the vascular plants of Churchill, Manitoba, using a DNA barcode library

The Hudson Bay Lowland is the Earth's largest more or less continuous temperate wetland landscape. Occupying % of the surface area of Canada, or km2, it is five times larger than the floodplain forests along the Amazon River.

Please contact mpub-help umich. For the region, the author documents natives vascular plant species and 98 non-native species. There are no keys and no descriptions, but the sources of the nomenclature are given in detail. In Appendix A, pages through , there are distribution maps, which combine occurrence maps dots with range-limit maps heavy black line. These range limits are difficult to interpret. A63, Elymus virginicus in eastern Canada, shows a range-limit line running roughly from Newfoundland to Manitoba. Since the range of the species is Newfoundland to Alberta, south to Florida and Arizona, the line may be understood to extend indefinitely to the west. I take the line to mean, "This species occurs generally south of this line. Taken literally, the map appears to be saying that the dots fall outside the range an interpretation that makes no sense , or that the dots represent new information, and the position of the range limits should now be changed. A, Zannichellia palustris in eastern Canada: Lawrence River and the Great Lakes, while the heavy black "range-limit line" runs down the St. This is emphatically not a limit of the range of the species. I think I am being most unfair to the author, but I cannot figure out what is meant by these lines. There are 32 color plates, some showing the terrain, others showing particular species. In general, this work will be of particular interest to the plant geographer, and especially to students of post-glacial re-establishment of a flora. Heard, and Luc Brouillet. Cultivated and Native Asters of Ontario Compositae: University of Waterloo Biology Series Paperback, Perfect or spiral bound. Because this fine volume contains numerous nomenclatural innovations, and is itself only dated as "," I am taking the liberty of amplifying that date, to reflect the date of the cover letter that accompanied the review copy. Absent any other information, that date may be taken as an indication of when this publication became available to the botanical public. If you just glance through the book, you are left wondering, "Where have all the asters gone? The matter is handled very succinctly in the preface, page viii, written by John C. Semple alone, [and dated September]: But plant names should also reflect phylogeny, as best that can be deduced, because this increases the information content of the name. Traditional Aster is highly polyphyletic, according to the molecular data, and encompasses members of many different branches of tribe Astereae. Traditional Aster, it is argued, was made up of all the species that were left over once all the other genera were separated out on their diagnostic features. It is what my undergraduate Botany professor called a "dustbin genus. I say "new" in quotes, because the adopted generic names are almost entirely from the nineteenth century; Oclemena dates from , and Canadanthus from , but all the others with respect to Ontario are much older-reflecting earlier efforts to separate out the natural units. It will not be labelled as a new edition. Semple has foreseen this: Some will continue to treat all asters in the genus Aster; some people believe that the earth is flat. If the molecular data have meaning, in concert with morphology and chromosome numbers, then the traditional notion of Aster has to give way. If you have had the pleasure of working with earlier contributions in this series, and I believe they are all still in print and available from John Semple, you will have noticed an evolution in the quality of the productions. This most recent one features 10 color plates, beautifully reproduced. All this is going to take a long time to digest. I am reminded of the uproar among taxonomists a couple of decades ago as an endless stream of small papers by Robert King and Harold Robinson served to dismember the genus Eupatorium into dozens of smaller units. The problem in Eupatorium was that there were no comprehensive keys, so that one could see how all the arguments worked. This was eventually rectified by the production of a fine monograph on the entire tribe Eupatorieae, and then the segregate genera began to be accepted in local and regional floras. With respect to manifold rearrangements in Aster, we will have a full-scale treatment for North America within a couple of years, and then perhaps we can look forward to relative stability. Semple, Heard, and Brouillet have made a good start, and their work merits close attention. For more information please contact mpub-help umich.

Chapter 3 : Hudson Bay Lowlands | Revolvy

Bay Lowland, (2) assess and characterize the distinct floristic zones in the region, and (3) examine the probable postglacial origin and mode of dispersal of groups of.

Overview[edit] General forest ecology[edit] The Canadian boreal forest in its current form began to emerge with the end of the last Ice Age. With the retreat of the Wisconsin Ice Sheet 10, years ago, spruce and northern pine migrated northward and were followed thousands of years later by fir and birch. This type of coniferous forest vegetation is spread across the Northern Hemisphere. These forests contain three structural types: Large populations of trembling aspen and willow are found in the southernmost parts of the Boreal Plains. However, the effects of forest fires and insect outbreaks differ from the effects of logging, so they should not be treated as equivalent in their ecological consequences. Logging, for example, requires road networks with their negative impacts, [16] and it removes nutrients from the site, which may deplete nutrients for the next cycle of forest growth. The northern regions of the boreal forest consists of four eco-zones â€" Taiga Cordillera, Taiga Plains, Taiga Shield and Hudson Plains â€" that are the most thinly treed areas where the growing season and average tree size progressively shrinks until the edge of the Arctic tundra is reached. These three southern zones are the Boreal Shield, at 1,, square kilometres the largest of the eight zones, the Boreal Plains and Boreal Cordillera. Most trees native to the Canadian boreal are conifers , with needle leaves and cones. A few are broad-leaved species: Since nutrient levels are so low, overall, the productivity of forest trees is highly dependent on the rate at which mineral elements such as nitrogen and phosphorus are recycled by litterfall and decomposition. Although there are rather few species of trees in the boreal forest, there is a considerable diversity of other kinds of plants. An accurate summary is difficult, since most compendia on plants are organized by political, rather than ecological boundaries; one exception addresses the flora of the Hudson Bay Lowland , [27] but much of this area is not forested. One portion of the boreal forest can be used to illustrate plant diversity; consider the Flora of the Yukon. Overall, the flora has speciesâ€"there are even 15 species of orchids. It has been estimated that the boreal region contains over 1. Soft water lakes predominate in central and eastern Canada and hard water lakes predominate in Western Canada. Most large boreal lakes have cold water species of fish like trout and whitefish, while in warmer waters, species may include northern pike, walleye and smallmouth bass. It can form extensive shrub barrens after logging. In contemporary times, the boreal forest has suffered little deforestation , defined as the permanent conversion of forest area to non-forest due to activities associated with agriculture, urban or recreational development, oil and gas development, and flooding for hydroelectric projects. In Alberta, the province with the largest oil and gas industry, more trees are cut for agriculture or oil and gas exploration than for timber. More deforestation has occurred outside the boreal region, in more southerly areas of the country. However, this is not considered deforestation by some, given that provincial laws are meant to ensure that areas harvested by the forest sector are replanted or regenerated naturally. Wildlife[edit] There may be as many as five billion landbirds, including resident and migratory species. The Canadian boreal region contains the largest area of wetlands of any ecosystem of the world, serving as breeding ground for over 12 million waterbirds and millions of land birds, the latter including species as diverse as vultures, hawks, grouse, owls, hummingbirds , kingfishers , woodpeckers and passerines or perching birds, often referred to as songbirds. For example, at least three species of warbler Cape May warbler, bay-breasted warbler and Tennessee warbler , have distributions and abundance related to spruce budworm outbreaks. Blueberries and huckleberries are also stimulated by fires, probably benefiting from the removal of shade, and the nutrients released in ashes. The resulting berries are an important food source for boreal forest animals. Few species of boreal wildlife are classified under government conservation regimes as being at risk of extinction. However, the decline of some major species of wildlife is a concern. Boreal woodland caribou , whose lichen-rich, mature forest habitat spans the boreal forest from the Northwest Territories to Labrador , is designated as a threatened by the Committee on the Status of Endangered Wildlife in Canada. Upland forests can be closely mixed with forested peatlands. The resulting conifer forests are produced by and dependent upon recurring disturbance from storms, fires, floods and insect outbreaks. Owing to the accumulated peat in the soil, and the predominance of coniferous trees, lightning-caused fire has always been a natural part of this forest. It is one of many ecosystems that depend upon such recurring natural disturbance. In a fire, the resin melts and the cones to open, allowing seeds to scatter so that a new pine forest begins see also fire ecology. It has been estimated that prior to European settlement, this renewal process occurred on average every 75 to years, creating even-aged stands of forest. Fire continues to cause natural forest disturbance, [42] but fire suppression and clear-cutting has interrupted these natural cycles, leading to significant changes in species composition. Fire effects[edit] Fireweed is a native wildflower that grows after forest fires. That average annual burn area is equivalent to more than three times the current annual industrial timber harvest. It can be many more times that in intense fire years. Fire is increasingly used as a management tool to maintain forest health in some parts of North America see fire ecology. Different parts of the boreal have different burn cycles. The drier western region, which receives lower average rainfall, had higher natural fire frequencies. Hence, more area is burned annually on average in the west than in central and eastern Canada. In addition, fire suppression causes fuel loads to increase so that fires, when they do occur, become more intense. One can argue that fire suppression actually creates a positive feed back loop, where ever more expensive fire suppression generates the conditions for ever larger fires. The negative effects of fire suppression are still under study, and not fully measured, but they need to be considered when making decisions about the future health of boreal forests. Region-wide planning[edit] Because parts of the boreal forest region are found in nearly every province and territory in Canada, there has not been much in the way of coordinated planning to develop the region. Prime Minister Diefenbaker talked of his "northern vision" [49] but little was done to see it come to pass. A Concept and was discussed by officials and politicians but was never implemented. In , John van Nostrand attempted to revive the concept.

Chapter 4 : - Flora of the Hudson Bay Lowland and Its Postglacial Origins

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Get this from a library! Flora of the Hudson Bay Lowland and its postglacial origins. [J L Riley; National Research Council Canada.] -- The Hudson Bay Lowland is the Earth's largest more or less continuous temperate wetland landscape.

Chapter 6 : [Book Reviews] Volume 42 Issue 3

Flora of the Hudson Bay Lowland and Its Postglacial Origins - J. L. Riley & John Riley; VIP.

Chapter 7 : EEBH - Families of Vascular Plants - The Hudson Bay Lowlands

Flora of the Hudson Bay Lowland and Its Postglacial Origins by John Riley Riley, with the Nature Conservancy of Canada, catalogs native vascular plant species from 11 sites in the Hudson Bay Lowland, which was more remote from extra-glacial flora during the deglaciation period than any other region of North America.

Chapter 8 : Flora of the Hudson Bay Lowland and its Postglacial Origins - Books - Volumes - Detail

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REVIEWS â€¢ FLORA OF THE HUDSON BAY LOWLAND AND ITS POSTGLACIAL ORIGINS. By JOHN L. blog.quintoapp.com: National Research Council of Canada Press, ISBN viii + p., maps, colour illus.

Chapter 9 : Comprehensive Report Species - Zostera marina

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