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## Reports from the anti-diabetic plant project

ሰላም  
2010  
August

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CIHR Team in Aboriginal Anti-Diabetic Medicines







በ<የጋዢው "እኩል" ማስረጃ ተስተካክለ ነው እና የሚገኘውን አድራሻውን የሚያስፈልግ ይችላል

## **Reports from the anti-diabetic plant project\***



**CIHR Team in Aboriginal Anti-Diabetic Medicines**  
•••• Équipe IRSC sur les médecines autochtones antidiabétiques

፳፻፱፲ ለ>፩” ፌ ማርያም ፌስቶ ን ፌለበኩስብንኩ  
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## Annual Team Retreat

CIHR Team in Aboriginal Anti-Diabetic Medicines

Mistissini, August 2010



Conseil Côte de la santé et des services sociaux de la Baie James

ՏԵՇԱՅԻ ԵՎ ԱՐԱ ՀԱՅ

Cree Board of Health and Social Services of James Bay

**\*CONFIDENTIAL:** Please note that this report is only intended for review by participants in the Anti-diabetic Plant Project. It contains confidential liiyiu traditional knowledge and confidential results from the academic researchers. A public report will be made once the information has been reviewed by the researchers, the elders and the communities.

↳ ["Akkusativ-Prinzip"](#):  $\nabla_{\Sigma^a} \cdot < \forall^a$

#### **Plain-language summaries: Ellen Bobet**

አዲሱ/አዲ ሌጋበጭ ከፋይ ሌናዣ

Cree translations: Brian Webb

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የኢትዮጵያዊያን

Photos: Alain Cuerrier

↳ [\[தமிழ் தேர்தல் கூடுதல்\]](#)

Design and page layout: Katya Petrov





We are now into our 8<sup>th</sup> year of collaboration on the anti-diabetic medicinal plant project. Our unique partnership involves Eeyou healers, elders, community managers and health system managers from Eeyou Istchee, and scientists from the Universities of Montreal, Ottawa and McGill. Officially known as the Canadian Institutes of Health Research (CIHR) Team in Aboriginal Anti-diabetic Medicines, the project continues to serve as a catalyst for opening up discussion around traditional medicine between scientists and healers, and within Eeyou Istchee. The project started in the region in 2003 because the Cree Nation of Mistissini was looking



for ways to promote Eeyou medicines and healing, and Pierre Haddad from the Université de Montréal had an idea that Eeyou medicinal plants might also prove effective as diabetes medicines, despite the fact that Eeyouch had not had much need for diabetes medicines before the 1990s. Soon after the project started, the Cree Board of Health formally adopted a position to promote Eeyou medicines and approaches to healing.

Beginning in Mistissini in 2003 (Whapmagoostui joined in 2004) with three-year funding from CIHR and the Natural Health Products Directorate of



Health Canada, the partners later received a five-year grant from CIHR that ends March 2011. This project began a discussion that continues to snowball, involving ever more people. This is especially true with this Final Annual Retreat hosted by the Cree Nation of Mistissini which has not only invited all the project partners from their own community, Whapmagoostui, Waskaganish and Nemaska, but also representatives from all the remaining communities.

- ◆ Specifically, on August 18, 2010, they will be hosting an Eeyou meeting to talk about the role of Eeyou medicine and healing within the region.

In the last few years, several key events occurred: Waskaganish and Nemaska were welcomed into the project; we signed a comprehensive research agreement to protect Eeyou knowledge and also to define our partnership; and Mistissini started the Putting Traditional Medicines First pilot clinical project, which supports people who want to use traditional medicines as part of their regular diabetes care. Currently, the team is looking for new research and community/partnership money to keep the project going from April 2011 onwards. If the project continues, we would encourage other communities to try clinical studies such as the one



running in Mistissini and adapt it in their own way. We also hope to continue to build formal links with other Aboriginal partners in Canada and in Belize.

All of the publications, local reports and documents from the anti-diabetic medicinal plant project are available on the project website which can be found at <http://www.taam-emaad.umontreal.ca/> or through <http://www.creehealth.org>. Because of the complex approval process within the project, many of the documents are not yet available to everyone. For now, this current report will remain confidential within the project and in the confidential section

of the website because it mentions aspects of traditional and scientific knowledge which may not yet have been approved by the healers and elders and made public by the scientists. Later it will become available on the main website.

If you wish to know more about the overall project please contact: **Nadine Methot**, the project's administrative coordinator at **(902) 446-2461** or [antidiabetic-trad-med@pharmco.umontreal.ca](mailto:antidiabetic-trad-med@pharmco.umontreal.ca) as well as **Tracy Wysote** at the Research Office of the Cree Health Board at **(418) 923-3355 ext. 273** or at [twysote@ssss.gouv.qc.ca](mailto:twysote@ssss.gouv.qc.ca). If you want to speak

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to someone about the Putting Traditional Medicines First Mistissini project, please call **Francis Awashish** at **(418) 923-3355** or at francisawashish@hotmail.com. You are also invited to contact Jill anytime at **(514) 953-8283** or at torrie.jill@ssss.gouv.qc.ca.

Jill Torrie

**Permanent Secretary of the Research Committee  
Assistant Director of Public Health  
Cree Board of Health and Social Services of James Bay**

Pierre Haddad

## Director

# *CIHR Team in Aboriginal Anti-diabetic Medicines*





- A. ደንብናል  
 B. ልኅፍረሁም  
 C. ነፋርር  
 D. የሸጋር  
 E. ዘመኑ  
 F. ዘቅናር

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- A. ደንብ
  - B. አዲስአበባ
  - C. የፌርማ
  - D. ፈጥ
  - E. ቤት
  - F. የፌርማ

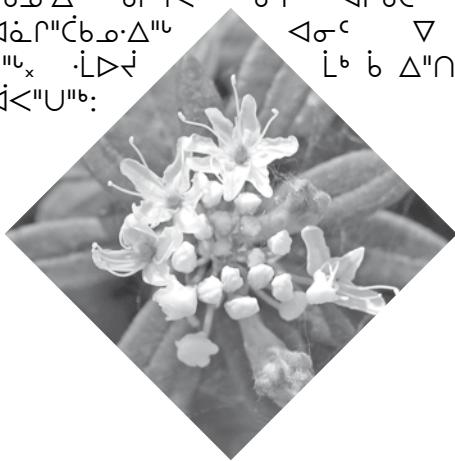
## Reports from the laboratories for February – June 2010

- A. Cuerrier
  - B. Arnason
  - C. Haddad
  - D. Bennett
  - E. Johns
  - F. Foster



**A. በጀትያው ደብዳቤ ማስቀመጥ እና የሚከተሉ ደረሰኑ**

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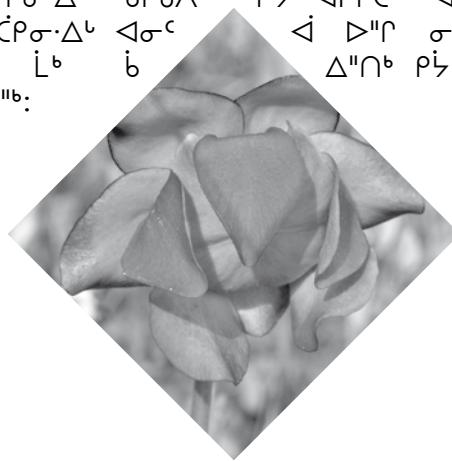


## **A. Report for the Cuerrier lab**

Ashleigh Downing has finished her thesis and has submitted it for review by the elders and by her master's committee. She is planning to prepare two articles from the thesis, and has begun work on them.

Michel Rapinski has been looking at how the strength of Labrador tea and pitcher plants changes depending on how far north the plants grow. This work, and Jonathan Ferrier's, is described in the

**A. በጀትያውን ደምና ማስረጃ እናናል ተከታታለሁ**



Arnason lab report. If the people in Chisasibi and Eastmain agree, Michel will come up this summer to see the plants and discuss them with the elders. Michel is also working on the booklet of information about 19 plants mentioned by the elders and healers. It should be ready by early Fall.

Youri Tendland has been looking at how much Labrador tea and pitcher plant you can harvest before you affect the population. Here is a summary of what he has done and found:

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▽ Δ"匁ጀ.Δ"ַ 1: אָלָא ቅ"ר ስ"ג  
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 Δ"匁ጀ.ብ" 0" ማ"ር▷የ"የ"ብ" ፈ"σ" የ"ל"ብና" ስ"ג  
 ▷"የ" ማ"ር▷የ"ብ" 0" x

▽  $\Delta'' \cap \dot{\Delta} \cdot \Delta'''$  2:  $\Gamma' \cdot \nabla \sigma \dot{\wedge} \vdash \Delta'' \cap \dot{\Delta} \cdot \Delta'''$   
 $\Delta''' \vdash \Delta''' \cap \dot{\Delta} \cdot \Delta'''$   $\Gamma' \cdot \nabla \sigma \dot{\wedge} \vdash \Delta'' \cap \dot{\Delta} \cdot \Delta'''$

▷  $\Delta'' \cap \dot{\Delta} \cdot \Delta''$  3:  $\Gamma^d \vdash \neg \exists x \Delta' \neg L_b \cdot b^o$   $\vdash \Delta''$   
 $\sigma \vdash \neg \exists x \Delta' \neg L_b \cdot b^o$ ,  $\alpha \vdash \Delta' \neg L_b \cdot b^o$   $\neg \exists x \Delta' \neg L_b \cdot b^o$

Դաստիարակության մեջ առաջատար է պատմական հայության պահպանը և արդի հայության զարգացումը:

## HARVESTING IMPACTS ON LABRADOR TEA

In 2008, we tried three different methods of harvesting Labrador tea. Our goal was to see how much you can harvest before you do damage. The three methods were:

Method I: we didn't collect any leaves, but we measured how many plants were in the patch.

- ◆ Method 2: we took all the leaves from all the plants.
  - ◆ Method 3: we took all the older leaves from the plants, but left that year's new growth.

Ճ ՃՄ ՀՌՈՒՋՆԱՐՅ Ճ ԼՇՈՎԵՐՈՎՆԱՐ

2008 ի ձեռնության մասին օրենքը հայտադրվել է ՀՀ օրենսդրության կողմէն 2008 թվականի հունվարի 1-ի օրը:

▷ Δ"ΗΦΑΣ·ΔΛ 1: σ-ΣΓ σ>"Γ Ι>"ΓΦΑΣ  
 ΦΛΑ", Γδ σ-Γ ΟΛΓΗΦΑΣ ΔΔΛΣ  
 Δ"ΗΦΔΛ" σ"ΦΔΓΗΦΔΛ" Δσ- <ΓΔΛ  
 Δ>"Γ σ"ΦΔΛ"

▷ Δ"∩ασ·Δυ 3: Γι Λ' Στρατηγού Γρηγορίου στάθμη  
στήνεται στην απόβαση, στην οποία στην πλευρά της θέτεται  
το έπιπλο της πόλης.

Then we went back in 2009 and looked at how well the Labrador tea plants were growing and how many leaves and fruits they had. Then we collected leaves again, using the same methods as the first time. The idea was to simulate intense harvesting.

We now have the results for the first year after harvesting (2009). In the areas where we'd taken all the leaves from the Labrador tea plants, their growth was set back. Although they actually produced more leaves than before, the leaves were smaller, and there was less fruit. In the areas where we'd taken only the older leaves, the plants were fine: they were growing

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- $\nabla b \mid D^{\sigma} \subset \Delta^{\sigma}$
  - 20%  $\nabla \Delta^{\sigma} \wedge \nabla \mid D^{\sigma} \subset \Delta^{\sigma}, b^{\sigma} \in \sigma \cap R^{\sigma} \cap B^{\sigma}$   
( $\sigma \in \mathcal{G}_d$ ,  $\Gamma^{\sigma} \subset \sigma \cap R^{\sigma} \cap B^{\sigma}$ )
  - 50%  $\nabla \Delta^{\sigma} \wedge \nabla \mid D^{\sigma} \subset \Delta^{\sigma}, b^{\sigma} \in \sigma \cap R^{\sigma} \cap B^{\sigma}$   
( $\sigma \in \mathcal{G}_m$ ,  $\Gamma^{\sigma} \subset \sigma \cap R^{\sigma} \cap B^{\sigma}$ )
  - 80%  $\nabla \Delta^{\sigma} \wedge \nabla \mid D^{\sigma} \subset \Delta^{\sigma}, b^{\sigma} \in \sigma \cap R^{\sigma} \cap B^{\sigma}$   
( $\sigma \in \mathcal{G}_d \cup \mathcal{G}_m$ ,  $\Gamma^{\sigma} \subset \sigma \cap R^{\sigma} \cap B^{\sigma}$ )

normally. It looks like it is safe to take all the older leaves from Labrador tea, at least once.

We will look at the Labrador tea plants again this summer, to see the results of harvesting two years in a row. We are guessing that in the areas where we took all the leaves, the plants will die. In the cases where we took only the older leaves, we think the plants will survive, but be slowed down.

## HARVESTING IMPACTS ON PITCHER PLANT

We used a similar approach with pitcher plant, starting in 2006. In this case, we tried four different methods:

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- <math>\Delta^u \wedge \exists x \forall y \sigma(x, y)</math>
  - 20%  $\Delta^u \wedge \exists x \forall y \sigma(x, y) \wedge \exists z \forall w \sigma(z, w)$   
( $\sigma \rightsquigarrow \exists x \forall y \sigma(x, y) \wedge \exists z \forall w \sigma(z, w)$ )
  - 50%  $\Delta^u \wedge \exists x \forall y \sigma(x, y) \wedge \exists z \forall w \sigma(z, w)$   
( $\sigma \nrightarrow \exists x \forall y \sigma(x, y) \wedge \exists z \forall w \sigma(z, w)$ )
  - 80%  $\Delta^u \wedge \exists x \forall y \sigma(x, y) \wedge \exists z \forall w \sigma(z, w)$   
( $\sigma \nrightarrow \exists x \forall y \sigma(x, y) \wedge \exists z \forall w \sigma(z, w)$ )

- No harvesting
  - Taking 20% of the plants (two out of every ten plants)
  - Taking 50% of the plants (five out of ten)
  - Taking 80% of the plants (eight out of ten)

We harvested only once, in 2006. Since then, we have been going back to the same areas each year to see if there are as many pitcher plants as there were before we harvested. We showed the results at the last meeting, but since then we have found a better way to measure. The revised graph below shows what happened to the number of pitcher plants in each area, depending on how many plants we took.



- The blue line shows that in the areas where we did nothing, there were more pitcher plants in 2009 than there had been at the start (in 2006).
  - The red line shows us that when we took 20% of the plants, the population bounced back by the next year (although it went down a little again two years later).
  - The green and purple lines show that when we took 50% or 80% of the plants, we had a serious impact. Although some plants came back, three years later there were still far fewer pitcher plants than at the start.

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ζ▷"σρσ·Δυ", η▷δ η α ι ρ ρ·ιλ"ζρσ·Δυ ζα  
ι Δυλυ η▷"σζ"υ σ"ζ▷ρ"ηρρυ" x



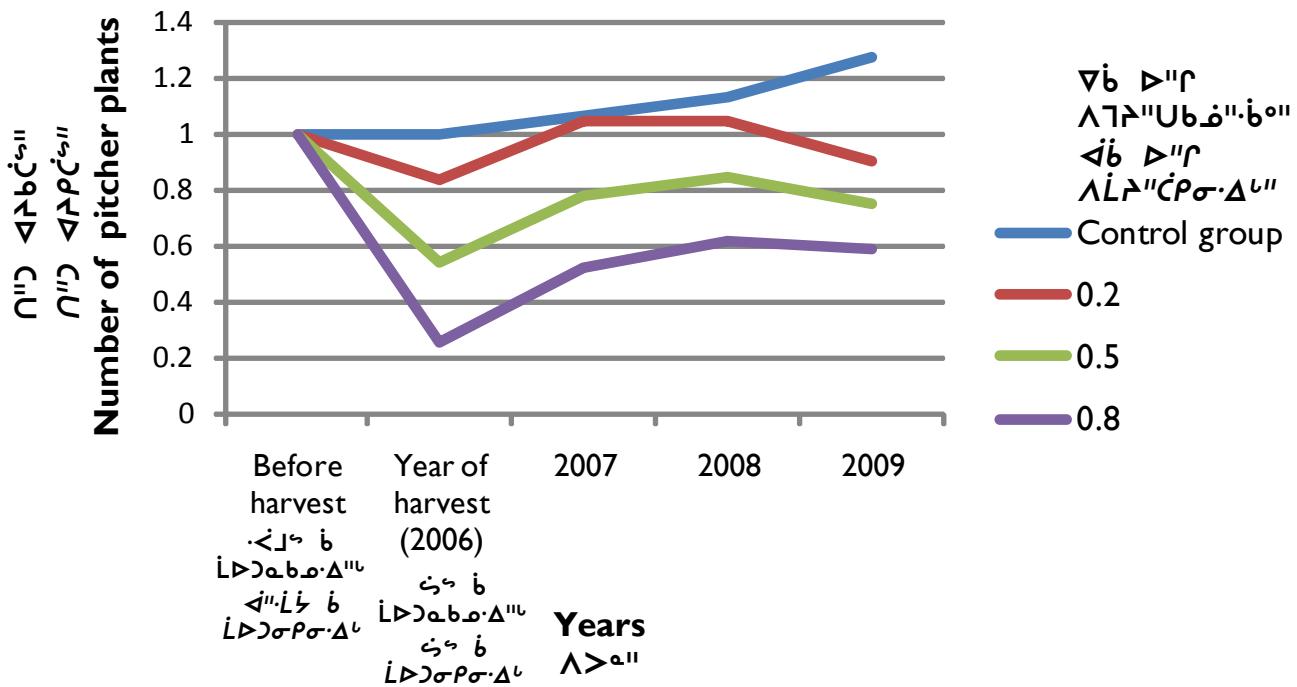
Perhaps some of the initial rebound in the number of plants (in 2007) is because seedlings and young plants filled in the spots where mature plants had been taken out. Decreases after 2007 could be because these seedlings did not survive. What is clear is that our harvesting has had an impact. But we are realizing that other things besides our harvesting may also have had an effect. We think we also need to consider things like temperature and how much of the growing area is covered by moss or shrubs. Youri will be looking at this in detail before our meeting in August.

This text is a simplified version of a more technical report from the Cuerrier lab.

▷ ◁ΔJR▫ ▷ ◁ΔR▫U▫ ▷ ◁RJ▫R▫"Δb▫ ▷ ◁R▫ ▷  
 ▷ R▫U▫ ▷ R▫R▫"Δb▫ ▷ σU ▷ R▫U▫ ▷ R▫U▫

•ΔԿ.Դ Ե Ծ"ՈԾ.Ե" Ե ԵՐ"ԻՆՆ.Ե" ՀԻՐ" ՀԾ" Ե ԼՇ"Ծ-ԵՖ".Ե" ՀԻՐ" ՀԾ" Ե ԼՇ"Ծ-Ծ-Ծ.Ե"

# Adjusted average of plots per treatments



## የጥቅምት ደንብ | ገዢ ደንብ Notes



**B.** በ<የንግድ> ደብዳቤ ማስታወሻ እና የሚከተሉት ደንብ  
ና ማስታወሻዎች  
(መ<አዲስአበባ> 2010)

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## B Report for the Arnason lab

I  
(June 2010)

The people in this lab have been trying to identify the ingredients in the plants. They have also been testing the plants and individual ingredients for various diabetes-fighting effects.

JOSE ANTONIO GUERRERO

At our June 2009 meeting, the elders and healers said it was important to look at tamarack. Jose Antonio has been doing some of this work. He has divided the tree's ingredients into 16 groups. Now

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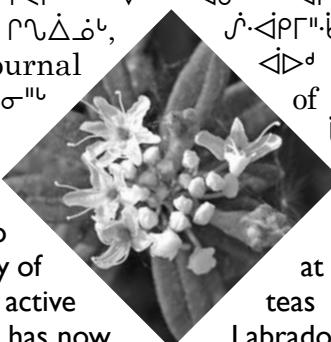
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the Haddad lab is testing these 16 groups (and the original tea from the complete tree) to see if they help fight fat. Once we know which groups have an effect, Jose Antonio will do more tests on those groups to try to find out exactly which ingredients are producing an effect. In the meantime, he has already been able to identify two more of the many ingredients in this tree.

Jose Antonio has also divided the ingredients from black spruce leaves and bark into groups, and sent them to the Haddad and Johns labs. The Johns lab will test to see if these groups fight the “free radicals” that can damage our veins.

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The elders recently approved an article on showy mountain ash that Jose Antonio had written. (The plain-language summary of this article was called “Identifying the active ingredients in showy mountain ash.”) He has now sent the article to the *Journal of Natural Products*, which is considering it.

ASIM MUHAMMAD

- ◆ Last June, the elders also spoke of marsh Labrador tea. Asim has prepared the plant for testing, and divided its ingredients into groups. Next, the Haddad lab will test the whole plant and the various groups

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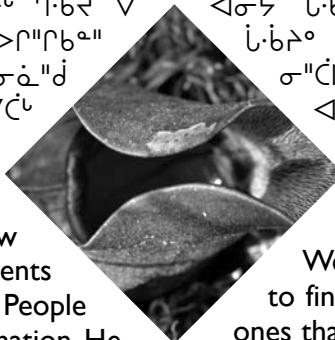
to see if they help cells to take in more sugar. Meanwhile, Asim has been looking at the ingredients in the two Labrador teas (northern Labrador tea and southern Labrador tea) to see if they are similar.

Asim has also been using specialized tests to look at the ingredients in pitcher plant leaves and roots, using the plants collected in 2009. He has prepared an article on the ingredients in pitcher plant that fight diabetes. If the elders approve it, this article will be sent to the *Journal of Natural Products* for publication.

ՀԱՅՈՒԹ ԱԿՏՆ-ՔՎԵ

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BRENDAN WALSH-ROUSSEL

Brendan is continuing his work on how some plants and their individual ingredients affect inflammation (heat and swelling). People with diabetes often have a lot of inflammation. He is testing each ingredient two ways:

- First, to see if it reduces inflammation.
  - Second, to see if it might also cause inflammation in some circumstances.

When he finds an ingredient with strong effects, he does further tests to see what dose would be best to fight inflammation. In our earlier tests, one of

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the plants that did the most to reduce inflammation was black spruce cones. We have begun studying these cones to try to find out which of their ingredients are the ones that fight inflammation.

MICHEŁ RAPINSKI

In our earlier tests, we had found that Labrador tea and pitcher plant both help fight diabetes. We think that the plants that have the largest proportions of active ingredients will have the most effect. So Michel is trying to find out what makes a plant high in active ingredients. He is using plants that were collected at

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four or five different latitudes (that is, further and further north). So far, he has been working mainly on Labrador tea. He expected that the further north the plant grew, the more active ingredients it would have. But his tests are showing the opposite: the more southerly plants seem to be stronger in active ingredients. We do not understand this. To explain it, we think we should consider things like:

- how many hours of light the plant gets each day
  - how much ultraviolet light the plant gets from the sunlight it receives
  - how much water the plant “sweats” away.

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We also want to do the same tests on pitcher plant.

AMMAR SALEEM

Ammar works on developing better tests for our project. He and Carolina have been working on a new test to be used with plants that protect nerve cells. As an example, we are using pitcher plant, which has some ingredients that protect nerve cells in lab dishes. But to work well in live animals, these ingredients need to move from the stomach up to the nerve cells in the brain after the animal eats the plant. Our new test can already detect even tiny

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amounts of these ingredients in the brain, so it will tell us if the ingredients are getting where they need to be.

Ammar has also found new ways to look at Labrador tea and marsh Labrador tea. The new tests let us assess if marsh Labrador tea's effects vary with the time of year. We have looked at 23 samples of marsh Labrador tea that were collected at different times. The plant seems to be powerful all summer.

Finally, Ammar has developed a new test to be used on the samples of showy mountain ash and American mountain ash that Anna Bailie collected.

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JONATHAN FERRIER

Jonathan is looking at the many plants in the blueberry and cranberry family that help fight diabetes. Some of these plants grow in Eeyou Istchee, and some grow in other parts of Canada or in other countries. Jonathan is applying our new method to “fingerprint” all of these plants. This will help us to identify the plants, and tell us if the different types share some family characteristics. We are also testing these plants to see if they fight high sugar levels. When sugar and protein react together, they help cause problems like nerve damage and heart disease. (People with diabetes get a lot of

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Journal of Natural Products 6 Δσσ" 6 U  
 "Bioassay-guided Isolation  
 of the Antidiabetic Principle from Sorbus  
 decora (Rosaceae) used traditionally by the  
 Eeyou Istchee Cree First Nation." Δ<sup>a</sup> L<sup>b</sup>  
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these problems, because they have so much sugar in their blood.) So a plant that reduces the amount of sugar available could help prevent nerve damage and heart disease.

## ARTICLES THAT ARE READY TO BE PUBLISHED

We have sent on article to the *Journal of Natural Products*. The authors are José Guerrero-Analco, Ammar Saleem, Padma Madiraju, Asim Muhammad, Tony Durst, Pierre Haddad, and John Thor Arnason. The article is called “Bioassay-guided Isolation of the Antidiabetic Principle from *Sorbus decora* (Rosaceae) used traditionally by the Eeyou Istchee Cree First

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“Isolation of the active antidiabetic principles of S. Purpureae”

Nation.” The plain-language summary of this article was called “Identifying the active ingredients in showy mountain ash.”

## ARTICLES BEING PREPARED

The people in this lab are working on five other articles:

- I. Asim Muhammad, Jose Guerrero-Analco, Padma Madiraju, Louis Martineau, Ammar Saleem, Pierre Haddad, and John Thor Arnason. "Isolation of the active antidiabetic principles of *S. Purpureae* used traditionally by the Eeyou Istchee Cree First Nation."

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#### OTHER ARTICLES THAT THIS PROJECT HAS MADE POSSIBLE

Cathy Sun, Kristina McIntyre, Ammar Saleem, Pierre Haddad, and John Thor Arnason. "The relationship between anti-glycation activity and procyanoanidin and phenolic content in commercial grape seed products." This article is not about the Cree plants, but it uses some of the tests and knowledge we developed in the Cree project.



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## STAFF CHANGES

San Nguyen has left the lab to write his thesis, and Michel Rapinski has joined it. A summer student, James Schlarbe, is helping Jonathan Ferrier.

This text is a simplified version of a more technical report from the Arnason lab.

## ለየወልደግኩሉ | ገዢያዊነት Notes



## C. Report for the Haddad lab (June 2010)

## UPDATE ON STUDIES OF HOW THE PLANTS AFFECT WEIGHT GAIN IN MICE

Recall that Despina has been looking at how balsam poplar and tamarack help prevent weight gain in mice. She had sent an article about this to the *Journal of Obesity*. (The elders reviewed the abstract for this article last fall. The plain-language title was “Evidence that balsam poplar and tamarack fight weight gain and insulin resistance in live mice.”) The journal turned down the article, but made some

**С. ՈՒՐՅՈՒՆԻԱՆ** ՏՐՈՒ ԱԾՎԱ "ՀՅՈՒՅՆ ՀԵՐԱԿԱՆ ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅՈՒՆ 2010")

suggestions about things that should be added to it. So Despina is now doing further tests to explain more precisely how the plants work inside the body to prevent weight gain. She plans to send her revised article to a different journal, called *Diabetes, Obesity and Metabolism*.

Despina is also starting work on a second article about how balsam poplar can reduce the weight of fat mice. This study will also discuss the differences you get when you dissolve the balsam poplar in water instead of in ethanol. She is still doing some lab tests on this subject.

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Despina, Antoine, and Diane are now repeating the “fat mouse” study with different plants and ingredients. As before, they are treating fat mice with a plant or one ingredient from a plant (along with a high-fat diet). Then they are checking if the plant helps the mice to stay slim, or to lose weight if they are already fat. In these tests, they are using:

- Just the active ingredient from balsam poplar (called Salicortin)
  - Tamarack tea made with ethanol, at two different doses

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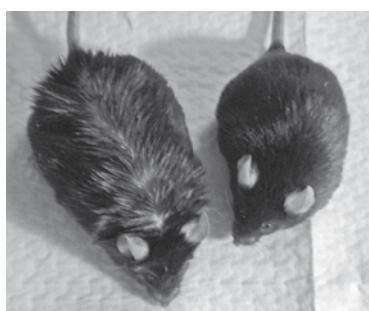
ԼՇԵ ԼՅ ԿԱ Յ ՃՄ ՐԿՊԱՅ:

- ◈¤ ካር·ኩባ¤ እ ህጻዣ"ከሮւ ስ·ኩ¤ ላ¤  
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·ልሆነዎች ልላይሁምና ሲ የ ለገመና
  - ◈ሃኔ ገጽ ላ ለገመና·ልኔ ·ይሆኔው", ላና·ልድ  
ለ ·ልሆነዎች ልላይሁምና ላዕ ተወ ሲ የ  
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  - ◈¤ ገጽ ላ ለገመና·ልኔ ሁኔታቸው"በሆነ", ላና·ልድ  
ለ ·ልሆነዎች ልላይሁምና ላዕ ተወ ሲ የ ሃ"ግናዎች  
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ለማስተካከል ላና ህጻዣ"ለሆነዎች, ላሚ  
ለማስተካከል ላና ህጻዣ"ለሆነዎች, ላሚ

- Speckled alder tea, at two different doses. They are making this tea two different ways: using ethanol, and using water.

So far, they have found that:

- The Salicortin from balsam poplar is very good at helping mice lose weight.
  - The high dose of tamarack seems to help the mice to keep weight off. It also improves their sugar levels and helps keep fat from building up in their livers.



Ե՞ս ԱՌՆ՝ Ե ՃՐ ԾՅՐԿՐՄՑՐՄ ՍԱՀԱ,  
ՃՎԿ-ՃՎ, ԵԿ ՀԵ՞, ՎՐՆՇ ԵԿ Ե ԾՅՐԿՐՄՑՐՄ ՍԱՀԱ  
ՂԵԼԵ ԾՎՀՇ ԱՌՆՇ ԾՅՐԿՐՄՑՐՄ Ե Վ ՃՐ  
ՀԵ՞ ԾՎՀՇ ԱՌՆՇ ԾՅՐԿՐՄՑՐՄ ԵԿ ԵԿ  
ԱՌՆ Վ ՃՐԿՐՄՑՐՄ ՀԵ՞ՆՇ ԱՌՆՇ ԾՅՐԿՐՄՑՐՄ ԵԿ  
ՃՎԿ ԼԵ Ե ԼՎՋԱՍ ԵԿ ՃՎԿՀՎՐՄ ՈՎՀԵՐՎ ՃԵՏԱՌԱ,  
ԵՐԴԵՐՆ Վ Ր Ր ՃՎԿՀՎՐՄ ԵԿ ՃՎԿՀՎՐՄ ԱՌՆՇ ԾՅՐԿՐՄՑՐՄ  
(ԾԿՐՄ Վ ՃՐԿՐՄՑՐՄ ԼՎՃՎԿՀՎՐՄ) ԵԿ ՃՎԿՀՎՐՄ ԵԿ  
ՀԵԼԵԼ ՐՄՐՆ Վ ՐԼԵ ՃՎԿՀՎՐՄ ԵԿ ՃՐ ՃՎԿՀՎՐՄ  
ԱՌՆ ԾՅՐԿՐՄՑՐՄ ԵԿ:

- 6% የ Δົກສອນ ດັຈ<ກົນ ດັ່ງລາດຈົ່ງສູນ
  - 10% የ "ຫົວໜ້າ" የ Δົກສອນ ດັກ<ກົນ ພົບ  
ດັ່ງລາດຈົ່ງສູນ ດັກ"ດ.ດິນຸ້າ
  - 65% የ Δົກສອນ ຖະກິດຕະກິດ ດັກ<ກົນ ບໍລິຫານ  
ກົມ.ດິນຸ້າກົມ"ດັກ<ກົນຕະກິດ ດັກບ ດັກ"ກ ຖະກິດຕະກິດ  
ຫຼືດິນຸ້າ
  - የ ດັຈ<ກົນ ດັກສອນ ບໍລິຫານ"ດິນຸ້າ" ແລ້ວ  
ກົມດິນຸ້າ (ນຳມາດ 42%) ດັກສອນ ດັຈ<ກົນ  
(ນຳມາດ ກົມ"ດິນຸ້າດິນຸ້າ" ດັກ ດັກ"ດິນຸ້າ" ແລ້ວ  
ດິນຸ້າ ກົມດິນຸ້າ, ດິນຸ້າ ປ ອີ່ ດັກດິນຸ້າ ດັກ"ດິນຸ້າ"  
ດິນຸ້າ ດັກ"ດິນຸ້າ" ດັກ"ດິນຸ້າ" ດັກ"ດິນຸ້າ")

- The high dose of speckled alder helps the mice to keep weight off and improves their sugar levels. But it only does this when the mice get tea made with ethanol. Speckled alder tea made with water does not have this effect.

Now they are trying to find out exactly how these plants work inside the body to produce these effects.

- ◆ Like Despina, Antoine, and Diane, Meriem Ouchfoun has also been looking at how the plants affect weight gain and sugar levels in mice. As noted in the February report, she fed Labrador tea (at three

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Ե Ր Ա Յ ՈՒՆ Ե Ր Ա Յ ՈՒՆ

- 6% የ Δົກສອນ ດັບດີເລືອດ ສຳເນົາ
  - 10% የ "C" ສຳເນົາ የ Δົກສອນ ດີເລືອດ ພົມ  
ຄໍາໄລຍະ ສຳເນົາ ດັບດີເລືອດ
  - 65% የ Δົກສອນ ຖະກິດຕົວ ດົກສອນ  
ກົມ-ເຄີຍກົມ ດັບດີເລືອດ  
ສຳເນົາ
  - የ ດັບດີເລືອດ ດົກສອນ ປະກິດຕົວ  
ກົມ-ເຄີຍກົມ (42% ດົກສອນ  
ດັບດີເລືອດ) (ເຄີຍກົມ  
ກົມ-ເຄີຍກົມ) ດົກສອນ  
ກົມ-ເຄີຍກົມ, ດົກສອນ  
ກົມ-ເຄີຍກົມ ສຳເນົາ  
ດັບດີເລືອດ ດົກສອນ  
ດັບດີເລືອດ)

different strengths) to mice, along with a high-fat diet. She found that the plant:

- Reduced weight gain by 9%.
  - Lowered blood sugars by up to 40%.
  - Reduced insulin resistance by up to 65%.
  - Reduced the amount of fat that got stored in the liver (too much fat can lead to fatty liver disease).

Meriem is now trying to figure out how Labrador tea does these things. She is looking at what the plant does in the muscles, in the liver, and in fat. So far, it looks like Labrador tea works one way in the

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muscles and a different way in the liver. In muscles, it does some of the same things insulin does, and increases the number of "trucks" that move sugar from the blood into the muscle. In the liver, it seems to work by making the cells burn more fat and produce less sugar than they otherwise would. Meriem is still testing what happens in fat tissue.

Meriem is currently writing two articles:

- I. "Catechin, epicatechin and quercetin are responsible for the antidiabetic activity of *Rhododendron groenlandicum*, a medicinal plant from the Bay James pharmacopea."

Ճաշկերպությունը կազմակերպվել է ՀՀ կառավարության կողմէ:



▷"እ"▷እሮ 31, 2010 በዚህ ደንብ ከ  
ገኘች ልማት የሚከተሉ የM.Sc. ትና  
▷የመስቀል ማረጋገጫ የሚከተሉ ይ  
ፈጸም የሚያስፈልግ ይችላል

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σιγάλην ἢ Διαβότι, ὁ Δούσιος "Δόξα" Δέ  
▷Γραμμή Δράση Ph.D θέτει στο βαθύτερο, αρχικό πλαίσιο της φύσης.  
▷Γραμμή Δράση ή Δράση ονομάζεται η δράση της φύσης στην οποία το άλλο σώμα παραδίδει στο άλλο σώμα μέρη της ενέργειας της στην παραδοσιακή φυσική. Η δράση στη φυσική είναι η αλλαγή που έχει γίνει στο άλλο σώμα από την επίδραση της δράσης.

2. "Rhododendron groenlandicum has antidiabetic activity in vivo in a diet-induced-obesity mouse model."

She will submit her M.Sc. thesis by August 31<sup>st</sup>, 2010.

## HOW LOWBUSH CRANBERRY HELPS MUSCLE CELLS ABSORB SUGAR

Hoda Eid submitted her Ph.D thesis in April, but will stay with us until the end of August so she can finish two other articles:

- I. A report on what happens when you give mice lowbush cranberry along with a high-fat diet. Hoda used a slightly different kind of mouse for her study. Unlike our previous studies, this one did *not* find that lowbush cranberries help mice to lose weight. However, Hoda is looking at the effects the cranberries had in these mice's muscles, liver, and fat.

help muscle cells take in more sugar. If they do the same thing in live people, this would help with diabetes. Hoda has found that these ingredients work by increasing the number of “trucks” that are available to move sugar from the blood into the muscle. Her article on this topic is titled “*Vaccinium vitis-idaea*, a medicinal plant of the Eastern James Bay Cree, mobilizes L6 muscle Glut4 transporters and exerts anti-obesity and antidiabetic effects *in vivo*.” It is being reviewed by the elders. (The plain-language summary of this article is called “Lowbush cranberries as a way to fight weight and diabetes: results from some studies on mice.”)

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▷ ሰርጊያዊነቶች የሚከተሉት በኋላ ስምምነት ይረዳል

▷ ማጀበኑንም በዚህ ደንብ ከ ንግድ የሚያስፈልጉ ይመለከት ይችላል

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 $\Delta \wedge J \wedge b \triangleright J'' \wedge \Gamma' \wedge \Delta$   $\vdash \sigma U \wedge J'' \triangleright (\triangleright \Delta \wedge J' \wedge b, \nabla \triangleright d \wedge \Delta \wedge J'' \wedge \Gamma' \wedge \Delta \wedge J' \wedge b \wedge U \triangleright d)$   
 $\Delta \wedge J' \wedge b \wedge U \triangleright d$   $\vdash b,$   $\Gamma \wedge \Delta \wedge J' \wedge b \wedge U \triangleright d$

## STUDY OF HOW TAMARACK AND BALSAM POPLAR AFFECT FAT IN THE LIVER AND GLUTS

Based on what the elders told us, and on Lidia Nistor's results, we are very interested in tamarack and balsam poplar. Caroline Ouellet has started studying whether these trees affect the way our gut absorbs fats and cholesterol. To begin, she is looking at the livers from mice that got a high-fat diet along with tamarack. (These are the mice from Despina's study.) Later, she will also look at other parts of these mice's digestive systems. The goal is to understand how tamarack affects specific parts of the system.

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ԾՀՐԱՆՎԼՊԾ.ՃԱ ՞ ԱԼԺՄՄ” Յ ՃՄԾ”ՅՑԿ”)

ՀԵԼ ՀՅ Հ ՃՄ ՀԱՌՈՒՐՈՒՆ ԵՐՄ-ՀՊՐՈՒՐՈՒՆ, ՀԿՍ ՀԾՈՒՐՈՒՐՈՒՆ ՐՅ Ի ՃՄՁԺԱՆ Հ ՀԱՌՈՒՐՈՒՆ ԵՇ ՔԱՀԱՆ Ի Ի ՀԱՌՈՒՐՈՒՆ ԿԻՖԾՈՒՆ.



## STUDY OF WHETHER THE PLANTS AFFECT HOW OUR LIVERS HANDLE SUGAR

Like insulin, some plants might be able to make our livers do two things:

1. Make less sugar than before;
  2. When sugar does get made, store more of it than before (this would keep the sugar out of the bloodstream).

Abir Nachar has been screening all the Cree plants to see if they do either of these two things (or both of them). She has found that nine of the plants help the liver to make less sugar than before. Eight

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plants help the liver to store more sugar. Now Abir is looking in more detail at exactly how the plants do this. She is writing an article about the results so far, titled "The antidiabetic activity of the Cree Bay James medicinal plants is mediated by inhibiting gluconeogenesis and stimulating glycogenesis in the liver." (As of mid-June, this article is not yet in the review process.)

- ◆ Balsam fir is one of the plants that had the strongest effects on how our livers handle sugar. Abir and the people in the Arnason lab are now gradually homing in on exactly which ingredient in balsam fir does this.

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Abir will finish her Master's thesis this August.

## LOOKING AT THE INGREDIENTS IN THE PLANTS

We have done many studies that look at the ingredients in the plants. But in most of these, we focused on certain kinds of ingredients that we thought were most likely to have effects. Now Nan Shang is looking at the ingredients in the group that we ignored, in case this group contains any active ingredients that we overlooked in our earlier studies.

Usually, we find much the same ingredients in the plants whether we make plant tea with ethanol or

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with water. But in a few cases we see big differences between the two. We think it is in these cases that we might have overlooked some important ingredients, since we did a lot of our tests using ethanol teas. So Nan will be looking at four plants where we got different results depending on whether we made the tea with water or with ethanol:

- sheep laurel
  - tamarack
  - pitcher plant
  - balsam poplar

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ԾՎՐԻՆՎԵԼՔԾԾ.ԴՀՆԱԽ Ա. 16 Վ Ա.ՊԱՍՈՒ Վ Ի  
Ա.Ա.ԱՂԱՅՈ Վ Ա.Ա.ԱՂԱՅՈ Վ Ա.Ա.ԱՂԱՅՈ Վ Ա.Ա.ԱՂԱՅՈ

This work will begin once the Arnason lab has sorted out some technical problems with the extracts.

Meanwhile, Nan has been looking at the ingredients in tamarack, since the elders suggested we focus on this tree. The ingredients have been divided into 16 groups, and Nan has tested each group for effects on fat. Three of these groups actually have more effect than tea made with the complete plant. Now Nan will take the strongest of these groups, and try to narrow down further to identify its individual ingredients.

לְגַדֵּלָה מִבְּנָה וְמִבְּנָה לְגַדֵּלָה

▷▫ ሰርጊምና” ሁኔታው” የውሃውን ስልጣን በኋላ የውሃውን ስልጣን በኋላ  
▷▫ ስልጣን በኋላ የውሃውን ስልጣን በኋላ የውሃውን ስልጣን በኋላ

- የንድፈሮ ማስታወሻ በ ንግድ የሚገኘውን ስምምነት መረጃ ይሰጣል
  - ጥሩ የሚከተሉት ስምምነት መረጃ ይሰጣል
  - የንድፈሮ ማስታወሻ በ ንግድ የሚገኘውን ስምምነት መረጃ ይሰጣል
  - የንድፈሮ ማስታወሻ በ ንግድ የሚገኘውን ስምምነት መረጃ ይሰጣል

ገ.ብ.ሔ ለታደረ እርዳና ፈይሁዳቸውን ይኖኝ ገዢ.ቧ  
የነገሩንበት በለዕስና ገዢ ስለመስጠና ገዢ  
ለ. የ ስሜ ለታደረ እርዳና ገዢ.ቧ የነገሩንበት በለዕስና ገዢ  
ቧ. የ ስሜ በ<የ>በት ለታደረ እርዳና ገዢ ስለመስጠና ገዢ  
በ.ግ.ሔ ይኖኝ:



## ይ. ከ. ሰ. የ. ማ. በ. የ. ስ. የ. ማ. በ. የ. ስ.

- የሸጻናዢና ላይ ፈያ ዘላማ በአዲነ ስብሰቦ ላይ ፈያ  
የተስተዋዢበት ማስረጃዎችን ማስረጃዎችን ማስረጃዎችን
  - ሁኔታ ላይ ሆኖም ለማስረጃ ላይ ማስረጃዎችን ማስረጃዎችን  
የተስተዋዢበት ማስረጃዎችን ማስረጃዎችን
  - እና ላይ እና እና የሚከተሉት ማስረጃዎችን ማስረጃዎችን  
የተስተዋዢበት ማስረጃዎችን ማስረጃዎችን
  - እና ላይ እና እና የሚከተሉት ማስረጃዎችን ማስረጃዎችን  
የተስተዋዢበት ማስረጃዎችን ማስረጃዎችን

ለ.ብ኏ ለንሱ እርዳታ ዘመኑ በትራንስፖርት ስርዓት ገዢ ተደርጓል፡፡

- ሰ የ ዘ"በለደኝ"ና ሰፏ ማ"ቃጠሪ"ና ተፈጻሚ ነው
  - ሰ የ ዘ"በለደኝ"ና ሰፏ ማ"ቃጠሪ"ና ተፈጻሚ ነው

- Tell us which of the plants have the strongest effects overall
  - Tell us whether there are links that we haven't noticed between some of the information. (For instance, whether plants with certain kinds of ingredients are especially good at fighting certain problems.)

This may lead to new ideas about how and why certain plants work better than others.

- ◆ Danielle Adeyiwola-Spoor is now trying to put all this information into one overall framework. If she can do this, we can use math to do things like:

▽ ·Δ"Cd"!u ▽ Δ'<ꝝ".b°!! ▷<rJrꝝ"Δb°!!

σες Λύρα "Άλεω" Λύρα "Άλεω" ή Λύρα "Άλεω" Λύρα "Άλεω" ή  
▷ U Δ ▷ "Γ σύριγκας" Λύρα "Άλεω" ή Λύρα "Άλεω" ή

1. ▷<sup>d</sup> ◁<sup>a</sup> “Stimulation of AMPK and enhancement of basal glucose uptake in muscle cells by quercetin and quercetin glycosides, active principles of the antidiabetic medicinal plant *Vaccinium vitis-idaea*” ↳ ΔΓσ"βŪŪ, ▽▷<sup>d</sup>

## STUDYING THE PLANTS' EFFECTS ON SOME OF THE "SIGNALS" THAT FAT TISSUE GENERATES

The different parts of our bodies send many kinds of signals to each other. Among other things, our fat tissue sends signals to tell us when we feel full, and to control some things about how insulin acts. In previous work, we had already found that several of the Cree plants affect how our bodies make and store fat. This summer, Charlotte Gauthier-Simard will be building on this work. She will test if the plants affect some of the signals that fat tissue sends. This should help us to understand how some of the

Ճ ԾՅՐՆՆՔ"ՀՔԾ.ՃԵ Հ՞ Ճ ՃՄ Հ"Պ"ՃՆԼԱՐՄ" Ժ"ՀԾՐՄ"ՐԲԱ" Ռ"Ր Հ՞ Հ՞ Հ՞ Ն ՃԻԼԱՐՄ ԼԻ ՀԾՐԾ Հ"ՐԲԱ

◀ ·Δ"Čđ"◀ ▶ Δ'Λꝝ" ▷◀ꝝjꝝσ"Δρα"

σ-ς) Γρα"Δρω" Λρ"ρ"ί" ρ' Γρα"Δρω" ο" Δ"ρ  
Δ"ρ Λ" Δ"ρ σ-ρη"σ-ρ" Κρα·Δ"ρ" σ"Δ"ρ" γρω" ρι"  
τι" ρ' Γρα"Δρω" Λρ"ρ" Λρ"ρ" Γρα"Δρω" ο":

1. ◀▷▫ ◀▫ “Stimulation of AMPK and enhancement of basal glucose uptake in muscle cells by quercetin and quercetin glycosides, active principles of the antidiabetic medicinal plant *Vaccinium vitis-idaea*” ▫ ΔΣσ▫▫, ◀▷▫

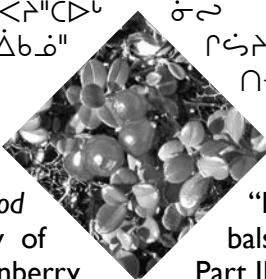
plants may affect appetite and improve the action of insulin.

## UPDATE ON PUBLICATIONS

Three recent articles from this lab have now been published:

I. "Stimulation of AMPK and enhancement of basal glucose uptake in muscle cells by quercetin and quercetin glycosides, active principles of the antidiabetic medicinal plant *Vaccinium vitis-idaea*." This article is by Eid, Martineau, Saleem, Muhammad, Vallerand, Benhaddou-Andaloussi, Nistor, Afshar, Arnason and Haddad. It has now been published in

Ճանաչումը կազմակերպությունների կողմէն կատարվել է 1990 թվականի հունվարի 1-ին:



a journal called *Molecular Nutrition and Food Research*. (The plain-language summary of this article was called "How lowbush cranberry works to lower blood sugar levels.")

2. and 3. "Anti-adipogenic activities of *Alnus incana* and *Populus balsamifera* bark extracts Part I: Sites and mechanisms of action." and "Part II: Bioassay-guided identification of actives salicortin and oregonin." These two articles are by Martineau, Hervé, Muhammad, Saleem, Harris, Arnason, and Haddad. They have now been printed in a journal called *Planta Medica*. (The plain-language article



“Fat-fighting potential of speckled alder and balsam poplar” summarized both Part I and Part II).

Two more articles have been approved by the elders, but are not yet published:

- I. "Prevention of diet-induced obesity and improvement of insulin sensitivity in an *in vivo* mouse model by two medicinal plant species of the Canadian Eastern James Bay Cree traditional pharmacopeia." This article is by Harbilas, Brault, Vallerand, Martineau, Saleem, Arnason, and Haddad. The *International Journal of Obesity* turned it down,

1. 

“Prevention of diet-induced obesity and improvement of insulin sensitivity in an in vivo mouse model by two medicinal plant species of the Canadian Eastern James Bay Cree traditional pharmacopeia”

International Journal of Obesity

Journal of Ethnopharmacology
2. 

“Inhibition of intestinal glucose absorption by antidiabetic medicinal plants derived from the James Bay Cree traditional pharmacopeia”

Journal of Ethnopharmacology

but a revised version will be sent to a different journal shortly.

2. “Inhibition of intestinal glucose absorption by antidiabetic medicinal plants derived from the James Bay Cree traditional pharmacopeia,” by Lidia Nistor Baldea, Louis Martineau, Ali Benhaddou-Andaloussi, John Arnason, Émile Lévy, and Pierre Haddad. This was sent to the *Journal of Ethnopharmacology*, which has asked for some revisions before it prints the article. (The plain-language version is called “Can the healing plants affect how our guts handle sugar?”)

1. “Prevention of diet-induced obesity and improvement of insulin sensitivity in an in vivo mouse model by two medicinal plant species of the Canadian Eastern James Bay Cree traditional pharmacopeia”

International Journal of Obesity

Journal of Ethnopharmacology

“Inhibition of intestinal glucose absorption by antidiabetic medicinal plants derived from the James Bay Cree traditional pharmacopeia”

Journal of Ethnopharmacology

#### STAFF CHANGES IN THE HADDAD LAB

- Lina Musallam, a former student of Pierre Haddad’s, joined us in March. She will be taking Louis Lavoie’s place as Research Coordinator for the lab.
- Charlotte Gauthier-Simard is joining us for the summer.
- Padma Madiraju and Louis Lavoie have left the lab.

This is a simplified version of a more technical report prepared by the Haddad lab.

▷ የሸፍርና ስራው ነው በዚህ የሚከተሉት ሰነድ ይፈጸማል



▷ □ΛΛΓ□ ▷ □ΛΛΓ□ ▷ □ΛΛΓ□ ▷ □ΛΛΓ□ ▷ □ΛΛΓ□ ▷ □ΛΛΓ□ ▷ □ΛΛΓ□

- ተቋ ጉኑጭ, ልማሪዎ እ ስብረታ-ፊር ለፏና "ፊር,  
የ ሆነዋለም" የ ል ላገድ ልለበያዊ ደር ገንዘብ  
እ ልማሪያው ልለፈ ሲ ተመሳሳይ-ፊር በ-ፊር  
ሁ-ፊር ልስተኛ ል ልለበያዊ ል ዘዴሮም" የ  
ልማ ማርካሬም" የ ልማሪ-ልማው ማርካሬም" የ
  - ተኋር- የ ልለበያና-የ ላገድ ላገድ ልለበያዊ ደር  
ለ-ፊር ልለበያው
  - የ ልማሪያው ላገድ ለጠና የ ላገድ ልለበያዊ ደር  
ለ-ፊር ልለበያዊ ደር ላገድ ማርካሬም" የ ልማሪ-ልማው  
ሙርካሬም"



የየዕለማዊትና የሚያስተካክለውን ስልጣን

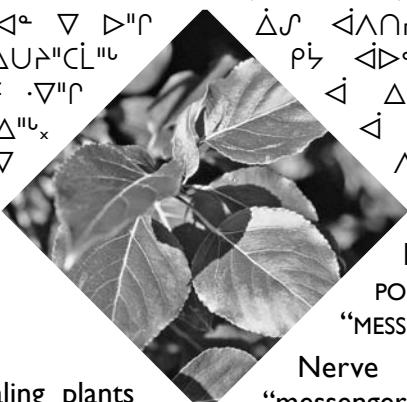


D.  $\cap \prec \mathfrak{f} \mathfrak{j} \mathfrak{r} \mathfrak{a} \wedge \Delta b \wedge \triangleright \mathfrak{f} \mathfrak{r} \wedge \sigma U \vee \sigma^c \wedge \leftarrow \nabla$   
 $\triangleright \mathfrak{f} \mathfrak{r} \prec \mathfrak{f} \mathfrak{r} \wedge$   
( $\Delta \lambda \sigma \lambda r L$  2010)

▷ U ∇ ▷ "r σ-̄r̄ȳḡz̄"̄C̄b̄f̄"̄.b̄ō σ-̄C̄D̄r̄"̄r̄b̄ē", ∇ d̄c  
∇ σ-̄r̄ȳḡz̄"̄C̄b̄f̄.Δ̄"̄s C̄.V̄ ဂ̄ ၊ ၊ ·Δ̄r̄"̄Δ̄.∇<̄z̄"̄.b̄ō  
σ-̄C̄D̄r̄"̄r̄b̄ē"̄ ၇၆ ဂ̄ ၊ ၊ ·Āk̄Ū"̄s Āσ̄c ၇။ ▷ "r̄  
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Āō ၇။ ·Āk̄Ū"̄s ၇။ ▷ "r̄ σ-̄r̄ȳḡz̄"̄C̄b̄f̄.Δ̄"̄s,  
၇၇ ဂ̄ ၊ ၊ ▷ "r̄ C̄.C̄"̄ō Ā.V̄σ̄r̄"̄.L̄"̄s Āσ̄r̄"̄ ၇။  
·Δ̄k̄b̄f̄"̄.Δ̄"̄s ▷ "r̄.Ā"̄s ၇။ C̄.C̄"̄ō ▷ "r̄.Ā"̄s ၇။  
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Āσ̄c ▷ "r̄ b̄ō.σ̄r̄"̄s ၇၃ ▷ "r̄ σ-̄r̄ȳḡz̄"̄C̄b̄f̄.Δ̄"̄s ၇၄.၇၅  
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၈၅ ▷ "r̄ σ-̄r̄ȳḡz̄"̄C̄b̄f̄.Δ̄"̄s

1. **ኋላ** እና **አዲስ** አበባ በትኩረት ስራ  
የተደረገውን የሚከተሉት ደንብ አለመ፡፡

አለሁ ልስር ቅዱስ የሚገኘውን አይነት ስምምነት እንደሆነ የሚያሳይ



## D. Report for the Bennett Lab (June 2010)

This lab looks at whether the healing plants can help prevent the nerve damage that goes with diabetes. When nerve cells get damaged, people get problems like pain in their hands or feet, lameness, or trouble seeing. In this lab, we have been looking at how the plants affect nerve cells in lab dishes, and in live animals. We are focusing on what happens inside a nerve cell to set off the changes that end up damaging the nerve.

D.  $\cap \prec r \jmath \gamma \sigma'' \Delta \rho \alpha$   $\triangleright'' r \triangleleft \sigma \dot{c}$   $\forall \sigma^c$   $\dot{c} < \dot{c}$   
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( $\vdash \cdot \cdot \cdot \dot{c}'' \dot{c} \triangleright \lambda r' 2010$ )

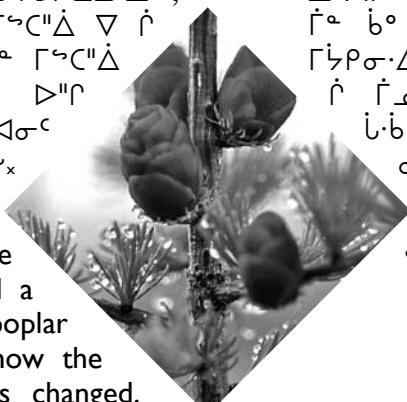
1. የ የመ.የአለ"ርምσ-ልኑ ፊል የ ስነ  
ር"ም"ልሳለያኑ" ገኑ የነት የገዢው ፊርማ የ  
ይሳለያኑ ሰ-ቁል ፊል ሰ ሆነላለያኑ ለ"በኑ ፊርማ  
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Հ՞ու Տօր Յ Շ"Ր ԾԿՐՁԾ.Ճ, ԾՃ"Ժ Ն Ե.Ե  
Ճ"ՈԺ Յ Շ"Ր ՎՀԱՂԲՆ Ն Շ"Ր ՐԿՆՀ"ՈՂՔԻՆ Հ՞  
Ն ՃՄ ՎՀՈՐԴՔԻՆ Տօ Յ Շ"Ր ԾԿՐՁԾ.Ճ—  
ՀԿԱԺ ՐՊ Ւ ՃՄՃ Յ Գ.ԼՆ ԲԼ ՏԺ Գ.ԼՆ Տօ  
Լ Յ Ժ.ՎԴՐԳ.ԵԾ.Ճ, ՐԿՆՀ"ՀԺ Յ Հ"Պ"ՃՆԼԱՂԲ  
Տօր Յ Շ"Ր ՎՀԱՂԲՆ Ն.Ե Հ՞ Ն ՃԱՂԲՆ  
Տօր Յ Հ"Ր ԾԿՐՁԾ.ՃՆ ՏԺ ՏՐ"Մ Յ Շ  
ՃՄ ՎՀՈՐԴՔԻՆ Տօ Յ Շ"Ր ԾԿՐՁԾ.Ճ,  
ԲԼ ՏԺ ՏՐ"Մ Յ ՃԿՀ"ՈՂԼ"Ն Տօ Յ Ն.Ե ՏՐ"Մ  
Յ ՃԱՂԲՆ, ՅԺ Յ Շ"Ր Ճ.Ճ.Ճ Ն ՃՃՈՂ"Ն Տօ  
Յ Շ"Ր ԾԿՐՁԾ.ՃՆ Տօ Յ ԾԿՈՂ Ե  
ԱՐԱՂԲ"ՀՀՆ Յ ԾԿՐԿՆՀ"ՈՂԼ"Ն. ՏԺ

## I. LOOKING AT HOW BALSAM POPLAR AND TAMARACK AFFECT THE “MESSENGERS” IN NERVE CELLS

Nerve cells contain several kinds of "messengers" that tell the cell to act in certain ways—ways that can be either good or bad. We know that diabetes interferes with these messengers. This causes changes in how the nerve cell works, and we think those changes lead to nerve damage. In our first set of tests, we looked at a special kind of nerve cell—nerves that connect to the spine. Damage to these specific nerves causes the tingling that some diabetics feel in their hands and feet.

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ԾՎԿՐ-ՖԱ-ԾՈ ԱՌՄ ՁՂԱԺՄՄ Դ ՃՄ-ԾՈ



In these tests, we looked at nerve cells from mice that had been fed a high-fat diet along with balsam poplar or tamarack. We wanted to see how the "messengers" in these mice's cells changed. We found that:

- If the mice got a high-fat diet but no healing plant, the messengers changed a lot.
  - If the mice got only a little balsam poplar with their diet, there was no effect. If they got a *lot* of balsam poplar, one kind of messenger went back to normal, but other kinds didn't.



- ◈אָ ◈אַלְמִינָהוּ גֶּדֶעֲנֵי אָ רָם גַּנְזָרָה-דָּכָךְ  
גַּנְזָרָה" לְבָנָה אָ שְׁלֹמָה-דָּכָךְ, σְּלָמָה ►"גַּנְזָרָה"  
גַּנְזָרָה" דְּלַעֲגָתָהָוּ גֶּדֶעֲנֵי לְבָנָה אָ גַּנְזָרָה-דָּכָךְ  
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►"גַּנְזָרָה" אַלְמִינָהוּ לְבָנָה לְבָנָה אָ שְׁרָפָהָוּ אָ  
►"גַּנְזָרָה" σְּלָמָה-דָּכָךְ, גַּנְזָרָה" רָם גַּנְזָרָה, σְּלָמָה  
גֶּדֶעֲנֵי ◈אַלְמִינָהוּ ►"גַּנְזָרָה" אָ שְׁרָפָהָוּ אָ dְּלַעֲגָתָהָוּ



- If they got a little tamarack along with their diet, several kinds of messengers went back to normal. If they got a lot of tamarack, even more kinds of messengers went back to normal. One particular kind of messenger—called C16:0 PAF—plays a role in causing Alzheimer's disease. We were very interested to see that high doses of tamarack brought this messenger back to normal.

These results tell us that balsam poplar and tamarack help protect nerve cells. They also tell us something about exactly *how* the plants do this. Next, we

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want to do the same kinds of tests using two more plants—Labrador tea and lowbush cranberry. Fida Ahmed and Carolina Cieniak will be doing this work.

## 2. TESTING IF PITCHER PLANT CAN PROTECT NERVE CELLS AGAINST OTHER KINDS OF STRESS

As we saw above, one way that diabetes damages nerve cells is by acting on their “messengers.” But high sugar also sets off other kinds of reactions that stress nerve cells. In our previous work, we had found that, in lab dishes, pitcher plant helped protect nerve cells against high sugar levels. Now Carolina

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and Fida are trying to get the same results in live mice. We plan to give the mice pitcher plant with their food for 80 days, then look at how well their nerve cells have resisted stress. We will also look at whether pitcher plant acted on the "messengers" in parts of those mice's brains.

This text is a simplified version of a more technical report from the Bennett lab.



לְרֹא "דָּגַן-דָּגָן" | רְרֹס "דָּלֵן-דָּגָן" Notes



**E. በጀትያው ደብዳቤ ማስታወሻ ከፌዴራል 2010)**

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## **E. Report for the Johns lab (June 2010)**

CHRISTINE TABIB

For her Master's

with people in Waskaganish. She is looking at whether there are links between people's cultural practices and how much they use traditional medicine. And she has been looking at how the move from bush life to village life changed people's beliefs and habits about food and medicines. Christine has found that people in Waskaganish still give a lot of time and attention to getting food and preparing it. But they do not do

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as many traditional activities as before. This is partly because they don't have the time, and partly because they need to earn money. Also, people have stopped using traditional plants and healing methods. They now have doubts about traditional healing, and there is debate about the spiritual beliefs that go along with it.

An important part of Christine's work has been to look at the health benefits of traditional culture. The anti-diabetic plant project hopes to get people doing things that will keep them healthy. They should know that the traditional way of life has many benefits. Christine has been writing about the benefits when people:

- $\nabla \cdot \vec{A} = \partial B / \partial t$
  - $\nabla \cdot \vec{E} = -\partial \phi / \partial t$
  - $\nabla \cdot \vec{B} = 0$

≤<sup>c</sup> n<sup>b</sup> >·A<sup>p</sup>

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 fat  $\dot{b} \Delta \mathcal{S} \sigma^{ab} \cup \cup$  ▽  $\Delta^a < \gamma^{ab}$   
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 $\dot{\Lambda}^{ab} \cup < \gamma^{ab}$ ,  $\nabla^d \nabla \Delta C \Lambda \dot{\Gamma} \dot{\Delta}^{ab}$   
 $\Delta^a \Gamma^b \Delta \sigma \cup \dot{\Lambda}^{ab}_x$

- use traditional medicines
  - eat traditional foods, and
  - take part in traditional activities.

Finally, Christine has been asking community members and health workers how they feel about traditional medicine. Except for people living at the Gravel Pit, most residents know very little about traditional medicines. Health staff also know very little. People have some doubts about traditional medicines, but are open to the idea of bringing them into regular diabetes care. But they say they would need help from the elders to do this. Perhaps as people learn more about

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how traditional plants can help with diabetes, they will be more willing to use them.

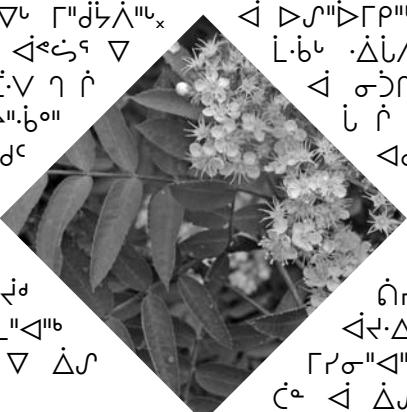
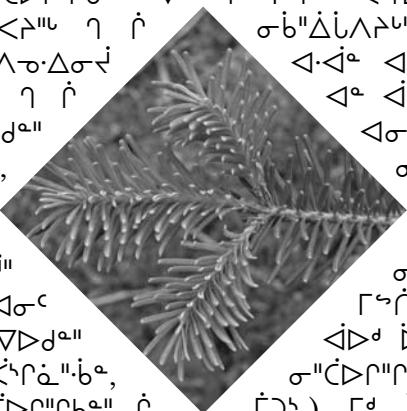
PATRICK OWEN'S STUDY

Patrick has been looking at whether the plants could help prevent fatty liver disease. This disease happens in two steps:

**Step 1:** When liver cells are exposed to some kinds of fat (saturated fat), they take it in, and get large drops of fat inside them.

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 ΑΓ̄Δσ<sup>c</sup> ▷<sup>a</sup> Δγ<sup>c</sup> ▷Δ<sup>a</sup>

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Վ"▫ ՞ ՞ ▷ Ձ"▫Ո"▫Ը"▫ ՞ ▷σ▫ ՞ ▷ Ձ"▫Հ"▫Ա"▫Ը"▫ ՞ ▷σ▫ ՞ ▷  
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Step 2: The fat drops set off an increase in the number of “free radicals” (damaging particles). This plays a part in causing fatty liver disease.

A plant that interferes with either one of these steps might prevent fatty liver disease.

Patrick has found that six plants interfere with the first step — they keep the liver cells from taking in fat. (The six plants are balsam fir, tamarack, showy mountain ash, pitcher plant, jack pine, and marsh Labrador tea.) Three plants make the liver take in

▷ Διάλεκτος 2: Λέξεις που αποτελούνται από μία σύνθεση των δύο γενικών κατηγοριών “free radicals” (αποτελούμενα από μία σύνθεση των δύο γενικών κατηγοριών “free radicals”) και την αντίστοιχη συνθετική λέξη.

more fat, which is not good. (The three are sheep laurel, stag's horn club moss, and balsam poplar.) However, all of the plants interfered with step two—the step where extra free radicals get made. Patrick is now working with Arvind Afshar to see whether a plant's effects on these two steps are related. Patrick is also looking at the work Sonia Grandi did in her thesis. He hopes to write an article about these effects.

## CORY HARRIS'S STUDY

Our past tests suggest that black spruce is one of the best plants for fighting free radicals. Cory and a

•בָּנָי "אַיִלְבָּן"



lab technician are now working together to try to find out which ingredients in the bark and needles do this. And Cory is trying to figure out how the ingredients in black spruce get moved to different parts of the body after a person (or animal) has eaten them or drank them in a tea.

Cory had already done some work on wild berries. Now he is building on this, along with the people in the Nituuchischaayihtitaau Aschii Environmental Health project. He wants to look at how berries might improve people's diets and reduce their risk

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of getting the problems that tend to go along with diabetes. He plans to look at:

- How often people in the different communities eat berries.
  - How much food value people are getting from berries as compared to the other fruits and vegetables they are eating.

This text is a simplified version of a more technical report from the Johns lab.

## ԼՐԱ"ՃՂ·ՃԱ" | ՐՐԾ"ՃՆ·ՃԱ" Notes

## F. Report for the Foster lab (June 2010)

This lab tests the plant medicines for safety. We are now at a stage where we are testing specific ingredients. We have begun with an ingredient in black spruce called "pungenin." We are doing the same kinds of studies on it as we did

- ◆ on Tamiflu last summer. When pungenin is eaten, our bodies break it down and change it in various ways, turning it into new kinds of ingredients. We are trying to see what these new ingredients might be. So far, we

have found six of these "breakdown" ingredients. We are looking at their structure (shape), which will help us to understand their properties. We are seeing signs that pungenin and the things it breaks down to might act as a heart medicine.

Our next step will be to test what happens when you put pungenin (or some of the other plants) together with a western diabetes medicine. Will putting these medicines together cause them to break down into different ingredients than before? If so, this



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 $\cdot\dot{d}\sigma^c$   $\cdot\dot{L}\cdot\dot{d}\cdot\dot{r}\cdot\dot{r}\cdot\dot{r}\cdot\dot{r}$   $\cdot\dot{d}''\cdot\dot{c}$   $\nabla \cdot\dot{r}$   $\cdot\dot{r}\cdot\dot{r}$   $>>''\dot{b}\cdot\dot{r}\cdot\dot{r}\cdot\dot{r}$   
 $\cdot\dot{d}''\cdot\dot{c}^{\circ}$   
 $(\dot{r})_x$
  3.  $\nabla \cdot\dot{r}\cdot\dot{r}\cdot\dot{r}<\dot{c}\cdot\dot{r}\cdot\dot{r}\cdot\dot{r}$   $\cdot\dot{d}''\cdot\dot{r}^o$   $\cdot\dot{c}^{\circ}$   $\nabla \cdot\dot{d}\cdot\dot{r}$   $\Delta\cdot\dot{r}\cdot\dot{d}''\cdot\dot{c}^{\circ}$   
 $\cdot\dot{b}\cdot\dot{b}^a$   $\nabla \sigma<\dot{d}\dot{r}\dot{c}\cdot\dot{c}^{\circ}$   $\cdot\dot{d}\sigma^c$   $\cdot\dot{b}\cdot\dot{r}\cdot\dot{r}<\dot{d}''\cdot\dot{c}$   $\cdot\dot{d}\cdot\dot{r}$   
 $\cdot\dot{d}''\cdot\dot{c}^{\circ}$   $\cdot\dot{d}''\cdot\dot{r}^o$   $\nabla \cdot\dot{d}\cdot\dot{r}$   $\sigma<\dot{c}\cdot\dot{d}\cdot\dot{r}\cdot\dot{r}$

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◀σ>r ḫ △r r.◦b" ◀σU ḫ~r.◦c ▽  
σ>c>f.◦c:



would also change the medicines' safety. The western medicines we are using in these tests are Gluconorm (repaglinide) and Diamicron (gliclazide).

Our lab has also helped the Arnason lab to:

1. Divide the ingredients in Labrador tea into groups and describe the size of each group.
  2. Measure the amount of certain ingredients in showy mountain ash extract (tea).
  3. Look at differences in Labrador tea ingredients depending on where the plant grew.

Ե ԵՐԱՎՆ? ▷ ԼԵ ՀԵՇ ԱԿԱԲՆ, <▷<sup>Ժ</sup> ՀՐԱՄ  
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-ՃՐԱԿՈԺՄԸ Ծ"ԺՀԱ<sub>x</sub> <Ծ"Ճ ԼԵ ՃՐԱԿՈԺՄԸ  
Ծ"ԺՀԱ<sub>ii</sub> Ճ ԾՅԻՆՏՐԱՌԼ<sub>ii</sub>, <▷<sup>Ժ</sup> Ճ ՔԵՒԺ-Ճ ԿԼ  
(ԿԵՒԺ-Ճ) Gluconorm (repaglinide) ԲԴ  
ՀԵԼՃԵՐԸ (ՔԵՒՆՃ) Diamicron (gliclazide)  
Ե ՃՄԸ"ՅՀՀ<sub>x</sub>



አዲለ"ሰ-ፈሮ-ል" በ<የጊዜያ"ዶወል" የነፃፃ

የΔ ኔ° የ ለኅብርና ሽጋዥና ሽግ ፌርት  
ለኅብርና ተያዙ ላ ሽጋዥና ሽግ ፌርት ላ

◀σ̄▶ ◀◀σ̄▶ ՚ ◀◀Λ◻▶ ՚ ◀σ̄◀ ◀◀ ▷"Ր  
Ծ"Ր"Ն"Հ"Ք"Ծ·Ծ" ՚ σ"Հ"▷Ր"Ր" ՚ ▷ ·◀Λ"Ղ·◀▷◀  
◀σ̄▶ ՚ ՚ △Մ ՚ Ր"Կ" ՚ ◀σ̄◀ ◀Ծ"Հ" ՚ ◀◀  
Ծ"Հ"Ծ·Ծ" ՚:



## PRESENTATIONS AND OTHER PRODUCTS

Rui Liu has submitted his Master's thesis for defence.

People in this lab have presented their findings at two conferences:

- I. Tam, Haddad, Arnason, Foster. "Safety pharmacology of the Cree medicinal plants: CYP inhibition and cardia chronotropic effects." Presented at the *First Nation and Inuit Health Branch's 2nd Biennial First Nations, Inuit and Métis Health Research Meeting* May 13-14, 2010, Ottawa, Ontario.

2. Liu, Tam, Mao, Saleem, Krantis, Haddad, Arnason, Foster. "Natural Health Product and Traditional Medicine Effect on the Activity of Human Hepatic Microsomal-mediated Metabolism of Oseltamivir." Presented at First Nations and Inuit Health Branch's 2<sup>nd</sup> Biennial *First Nations, Inuit and Métis Health Research Meeting* May 13-14, 2010, Ottawa, Ontario, Canada

3. Liu, Tam, Mao, Saleem, Krantis, Haddad, Arnason, Foster. "Natural Health Product and Traditional Medicine Effect on the Activity of Human Hepatic Microsomal-mediated Metabolism of Oseltamivir." Presented at the *Canadian Society for Pharmaceutical Sciences Annual Symposium*, Vancouver, June 2010.

This text is a simplified version of a more technical report from the Foster lab.

የየወለደና የሚያስተካክሉት አገልግሎቶች | ጥሩ ተመዝግበ የሚያስተካክሉት አገልግሎቶች



Species	English Name	Cree Name	Southern Dialect	Northern Dialect
<i>Abies balsamea</i>	Balsam fir	Inaasht	Δ̄.ጀ̄c īnāsht	Δ̄ጀ̄c īyāshīht
<i>Alnus incana</i> subsp. <i>rugosa</i>	Gray alder	Atushpi	▷ጀ̄.ጀ̄ utūspī	▷ጀ̄.ጀ̄ utuspī
<i>Andromeda polifolia</i> L.	Bog rosemary	Uschischibuk	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ uschischipikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ uschischipikw
<i>Betula papyrifera</i>	Paper birch	Ushkui	▷ጀ̄.ጀ̄.ጀ̄ ushkui	▷ጀ̄.ጀ̄.ጀ̄ wishkui
<i>Cladonia rangiferina</i>	Gray reindeer lichen	Wapskamkw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ wāpisksamikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ wāpisksamikw
<i>Empetrum nigrum</i>	Crowberry	Eshjeemenan	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ aschiminh	▷ጀ̄.ጀ̄.ጀ̄ aschiminh
<i>Gaultheria hispida</i>	Creeping snowberry	Pieuminaan	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ piyeuminānh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ piyāuminh
<i>Heracleum maximum</i>	Cow parsnip	Wipashtk	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wīhpāshhkw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wīhpāskw
<i>Juniperus communis</i>	Ground juniper	Kakachiliinatuk	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ kāhkāchimināhtikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ kāhkāchimināhtikw
<i>Kalmia angustifolia</i>	Sheep laurel	Uishichipukw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ uschischipakw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄ uschischipikw
<i>Larix laricina</i>	Tamarack larch	Watnagan	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wāchinākan	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wāchinākin
<i>Leymus mollis</i> *	American dune grass	Weenibekushkushuh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wiinipekushkushuh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wiinipaakushkushuh
<i>Lycopodium clavatum</i>	Stag's horn club moss or ground pine	Pashtnahoagin	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ pāschināhkvwākan	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ pāsināhkvwākin
<i>Picea glauca</i>	White spruce	Minhikw	▷ጀ̄.ጀ̄.ጀ̄ minahikw	▷ጀ̄.ጀ̄.ጀ̄ minihikw
<i>Picea mariana</i>	Black spruce	Inaahitkw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ īnāhtikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ īyāhtikw
<i>Picea mariana</i>	Black spruce (bog)	Maschegetulk	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ mashewāhtikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ mischekwāhtikw
<i>Pinus banksiana</i>	Jack pine	Ushchishhk	▷ጀ̄.ጀ̄.ጀ̄ uschisk	▷ጀ̄.ጀ̄.ጀ̄ uschisk
<i>Populus balsamifera</i>	Balsam poplar	Miitus	▷ጀ̄.ጀ̄.ጀ̄ mītus	▷ጀ̄.ጀ̄.ጀ̄ mītus
<i>Rhododendron groenlandicum</i>	Labrador tea	Kachichepukw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ kāchichēpakw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ kāchichāpkw
<i>Rhododendron tomentosum</i>	Northern Labrador tea	Weeshichbulsh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wīshashipakush-h	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wīshchipikush-h
<i>Salix planifolia</i>	Willow	Pieuatlkw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ piyeuwāhtikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ piyāuwāhtikw
<i>Sarracenia purpurea</i>	Pitcher plant	Ayigdash	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ ayikatāsh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ ayikitāsh
<i>Sorbus decora</i>	Showy mountain ash	Mushkuminanatikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ maskuminānāhtikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ miskumishī
<i>Sphagnum fuscum</i>	Common brown peat moss	Awashishee	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ awāshishīchī	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ awāshishchīsh
<i>Stereocaulon paschale</i>	Common coral lichen	Wabuwakunapwkw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wāpiwāhkunāpiskw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wāpiwāhkunkh
<i>Thuja occidentalis</i>	Cedar	Maastchiisk	▷ጀ̄.ጀ̄.ጀ̄ māschīsk	▷ጀ̄.ጀ̄.ጀ̄ māschīsk
<i>Typha latifolia</i> *	Cattail	Uchshkoyushkushu	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ uchshkvwāyushkushū	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ uchshkvwāyushkushū
<i>Vaccinium angustifolium</i> *	Low-bush blueberry	Minshe	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ īmininānh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ īyiminh
<i>Vaccinium uliginosum</i>	Alpine bilberry	N'chiminatuk	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ nichikumināhtikw	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ nichikumināhtikw
<i>Vaccinium vitis-idaea</i>	Mountain cranberry or lingonberry	Wishichimna	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wīsachiminānh	▷ጀ̄.ጀ̄.ጀ̄ <ጀ̄.ጀ̄ wīsichiminh

\* σ-Δ Δ̄ j̄s̄ <Δ̄.ጀ̄.ጀ̄ \* not often mentioned during interviews

\* σ-Δ Δ̄ j̄s̄ <Δ̄.ጀ̄.ጀ̄ \*