October 3 – Ice Cream Headaches

Last night I was having a nice big piece of birthday cake with ice cream on the side. During this excellent dessert we got to talking about ice cream headaches. I think most people have probably experienced the excruciating pain that accompanies eating ice cream or consuming other cold products too quickly. The scientific name of this phenomenon is *sphenopalatine ganglioneuralgia*…I just gave myself another headache trying to spell that word! So this week we are going to learn why we get ice cream headaches and if there is anything we can do to prevent them!

***Always remember to ask an adult before doing any science experiment.**

Materials:

- Ice cream
- Brain (this should be easy, especially if you are a regular reader of these articles!)

Procedure:

1. Eat the ice cream.
2. Read the rest of the article.

I figure we can't talk about ice cream unless we are eating ice cream! Anyway, that horrible pain known as an ice cream headache or sometimes brain freeze is caused by the rapid cooling of our palate (the roof of our mouth). This rapid cooling of the palate convinces our body that it is too cold; it then causes rapid dilation of the blood vessel in the palate. This rapid dilation allows an increase in blood flow and subsequently warms up the area. So why does this hurt? The rapid dilation is what is triggering the pain. A nerve (know as the trigeminal nerve) detects this rapid dilation of the vessels in the palate and signals the brain. In doing so it convinces the brain that the pain is coming from the forehead region!

There are a couple things you can do to decrease the severity of ice cream headaches, they may or may not work for you, so give them a shot. They include;

- Eat or drink cold things slowly! Allow your tongue to warm up the substance before allowing it to hit the roof of your mouth.
- As soon as you feel a headache coming on place your tongue up against the roof of your mouth, this may assist with warming up your palate.
- Sip warm water or other liquids to help warm your palate.
- Stop eating ice cream – Just kidding! I have never had an ice cream headache that bad!

Have a great week!

Upcoming Events

Praxis will be hosting their annual Family Science Olympics on Saturday October 17th from 10:00 am – 3:00 pm at Medicine Hat High School (in the Taylor Science Wing – enter on 5th St. S.W.). There will be many hands on activities, lots of prizes, and it's free of charge. One adult must be present with each family. Give us a call 403-527-5365 for more information. See you there!

Jeff Unrau
Regional Executive Director
Praxis the Science and Technology Hotline

October 10 – Leaving Changing Colour

As the seasons are changing it is easy to see that something else is changing – the colors of the leaves! This change is probably even more apparent for everyone who has to clean up all these falling leaves – why can't they just stay on the trees? Why do leaves change color anyway? This week we are going to learn a little bit about why leaves act the way they do.

***Always remember to ask an adult before doing any science experiment.**

Now today's article isn't really an experiment, but that doesn't mean it can't still be fun! So the first step is for everyone reading this article (it doesn't matter how old you are) to go outside, rake a big pile of leaves, and then proceed to jump and play in the leaves – all they while pondering why they even changed color and fell to the ground in the first place.

So why do the leaves change color and fall? At first thought you could assume that it is due to temperature changes, as the temperature falls…so do the leaves! This is not the case! However, temperature does play a role in these changes, but the major factor that regulates this process is the amount of daylight! The amount of daylight is a far more reliable indicator of seasonal changes as it remains quite constant for a particular time of year while temperatures can fluctuate wildly. As the nights grow longer the production of chlorophyll decreases (chlorophyll is the stuff that makes leaves green). The decrease in chlorophyll allows two other pigments to show off their colors. These pigments are known as carotenoids and anthocyanins, and allow for colors rangin from yellow, brown, red, and orange. In addition to the decreasing amount of daylight, lower temperatures and decreased moisture play a role in the color changes – making it impossible to predict when exactly the leaves will start changing color.

So why do the leaves fall? The thin broad leaves are unable to survive freezing temperatures so they must be lost. As the amount of daylight decreases the leaves begin to close off their veins from the rest of the plant – this traps sugars in the leaf and increases production of anthocyanonin (remember this one?). Once the veins are completely closed and sealed off the leaf falls and the tree is ready for winter. Bring on the cold!

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Praxis is also partnering with the Medicine Hat Public Library and is proud to present the following two guest presentations;

Science Smarts Column –October 2009

Sunday October 18th, 2:00 pm – Forensic Officer Cst. Dave Allen.
Wednesday October 21st, 7:00 pm – Dr. John McFee – Defence Research and Development Suffield.

Both presentations are free of charge and are at the Medicine Hat Public Library. Following the Sunday presentation there will be hands on forensic activities for everyone to experience.

Give us a call 403-527-5365 for more information. See you there!

Jeff Unrau
Regional Executive Director
Praxis the Science and Technology Hotline

October 17 - Does Turkey Make You Sleepy?

As last weekend was Thanksgiving and I ate a ton of turkey…I thought, why not write about it! Everyone has heard the rumours about how turkey makes you sleepy, there is some merit behind this rumour but perhaps not exactly what you would expect!

The substance in turkey that is believed to cause this drowsiness is the amino acid known as tryptophan. Amino acids act as building blocks in the production of proteins, this specific amino acid is known as an "essential amino acid" meaning that our bodies are unable to produce it and it must be obtained from out diet. Tryptophan is found in many high protein foods, including egg whites, fish, milk, poultry (including turkey) and many others.

So how did this rumour get started? Well let's think about what tryptophan can be used for in our body. Tryptophan once consumed, is converted into serotonin – a neurotransmitter which helps to regulate our sleep. So the rumours are true!? Not exactly…tryptophan is found in much higher levels in other foods – foods which may not give us that oh so common "turkey drowsiness". So what is happening? Typically we are not only eating turkey, our turkey is usually consumed with a larger Thanksgiving meal, a meal which is rich in carbohydrates. These high levels of carbohydrates stimulate the production of insulin in the human body which allows for the concentration of tryptophan to effectively increase (some other amino acids leave the bloodstream and enter the muscles). This increase in relative concentration allows for a greater production of serotonin. So even if you swapped that turkey for another high protein meat, you are still likely to experience this drowsiness – but why not take a nap anyway, it is the holidays! For more information check out the following website:
http://chemistry.about.com/od/holidaysseasons/a/tiredturkey.htm

I hope everyone had a great Thanksgiving!

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Give us a call 403-527-5365 or send me an email praxis@praxismh.ca for more information. See you there!

Jeff Unrau
Regional Executive Director
Praxis the Science and Technology Hotline

October 24 – Leaf Chromatography

Well here's another fall article…it is kind of a follow up from an article I wrote two weeks ago…cause hey who doesn't love fall?

***Always remember to ask an adult before doing any science experiment.**

Materials:

- One green leaf (you might have to search to find one!)
- One coin
- One strip cut from coffee filter paper
- Rubbing alcohol
- Glass jar or cup

Procedure:

1. Place the strip of filter paper on the table
2. Put the leaf on top of one end of the filter paper.
3. Roll the edge of the coin back and forth over the leaf so that a green line of leaf material is left across the filter paper about 2 cm from the tip.

4. Allow the leaf material to dry on the filter paper.
5. Add a small amount of rubbing alcohol to your jar (about 1 cm full), be careful it's poisonous!
6. Suspend the tip of the filter paper into the alcohol so that the green line is about 1 cm above the level of the alcohol.
7. Watch what happens as the alcohol travels up the strip of filter paper past the green line, this may take 5-10 minutes so be patient!

Explanation:

Using this chromatography (colour separation) method, you will see that there are different chemicals in the leaf, each with its own colour. In fall, the green chlorophyll is the first colour to break down in the leaf, leaving time in the autumn for other chemicals in the leave to show their colour. Each species of plant has different amounts of the differently coloured chemicals in the leaves.

Repeat this with the leaves of various trees. If you already know what colour their leaves change in the fall, compare this knowledge with the colours that turn up on your filter paper.

Have a great week!

Jeff Unrau
Regional Executive Director
Praxis the Science and Technology Hotline

October 31 – Sugar

Well today is Halloween! When I think of Halloween I think of two things, costumes and candy. And when I think of candy I think of sugar…lots and lots of sugar. So to stick with a Halloween theme we are going to do an experiment with…you guessed it, sugar!

***Always remember to ask an adult before doing any science experiment.**

Materials:

- Three clear drinking glasses
- Plain white sugar
- Tea spoon
- Water
- Pencil and paper.

Procedure:

1. The plan is to determine how much sugar can dissolve in different water temperatures. So the first step is to prepare water at three different temperatures. For cold water mix water and ice and let sit for a few minutes – remove the ice and you are left with cold water! Brrrr – add this to one of your glasses. The second glass you can fill with warm tap water (to the same level as the first glass) and the third glass should be filled with hot water (have an adult help you with this!).
2. To your first glass add one teaspoon of sugar – stir until the sugar dissolves. Repeat this procedure until no more sugar dissolves (sugar will build up on the bottom of the glass – at this point the solution is said to be saturated). You may want to add only half a tea spoon at a time to increase your accuracy! Record the amount of sugar added.
3. Repeat this procedure for the remaining two glasses – record the amount of sugar added. What do you notice?

Explanation:

So you should have noticed that the hot water dissolved the most sugar, but why? Why does sugar dissolve in water in the first place? Water is known as a solvent, when sugar is added to the water a sucrose molecule breaks from the sugar crystal and is immediately surrounded by water molecules. This molecule is now shielded from the other sugar molecules and is unable to reform and subsequently stays dissolved. So why was more sugar able to dissolve in hot water? As the temperature of water increases the water molecules move faster and faster (they are said to have higher energy). The increased speed increases the distance between the molecules – it is this greater distance which allows for the surrounding of more sugar molecules. When this hot solution cools down the solution is said to be supersaturated – meaning that it now contains more sugar than could be dissolved normally in water of that temperature. Pretty cool stuff – have a good Halloween! Be sure to brush your teeth after all your candy!

Check us out on Twitter at http://twitter.com/PraxisMedHat.

Jeff Unrau
Regional Executive Director
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