The Story of Plastics by Vicki Turay

1. Origins of Plastics

One of the questions we are most frequently asked at the Recycling Depot on Mayne is what happens to the plastics. The short answer is that the plastic that comes into our depot is 100% recycled within our province, but more on that later.

This is the first of a series of articles on this subject of plastic that will examine the origins, uses and abuses, and what the future holds for this wondrous and problematic product.

Plastic is composed of polymers that are long flexing chains of atoms bonded in a repeating pattern into a gigantic molecule. Every living organism contains these molecular daisy chains. The cellulose that makes up the cell walls in plants is a polymer, so are the proteins that make up our muscles and our skin.

Inventors and scientists working with these naturally occurring polymers have created lab-synthesized plastics. One of the first attempts to create this synthetic product came about because of a desire to save the elephants. In 1867 a *New York Times* dispatch warned that elephants were in grave danger of becoming extinct because of humans' insatiable demand for the ivory in their tusks. One of the biggest uses was for billiard balls.

In 1863, a New York billiards supplier ran a newspaper ad offering ten thousand dollars in gold to anyone who could come up with a suitable alternative for ivory. This challenge was taken up by a 23 year old man, John Hyatt, who had no formal training in chemistry. He began experimenting with various combinations of solvents and a doughy mixture made of nitric acid and cotton. In 1869, after years of trial and error, Hyatt ran an experiment that yielded a malleable substance that could be made as hard as horn. It shrugged off water and oils. It was created from a natural polymer — the cellulose in the cotton — but had a versatility none of the known natural plastics possessed. This new material was dubbed *celluloid*, meaning "like cellulose".

As Hyatt's company boasted in one pamphlet, "celluloid has given the elephant, the tortoise, and the coral insect a respite in their native haunts, and it will no longer be necessary to ransack the earth in pursuit of substances which are constantly growing scarcer." While celluloid would prove a wonderful substitute for ivory, Hyatt apparently never collected the ten-thousand-dollar prize.

For all its significance, celluloid had a fairly modest place in the material world of the early twentieth century, being both labour intensive and dangerous to work with. It wasn't until the development of more cooperative polymers that plastics truly began to transform the look, feel, and quality of our lives. By the 1940's, we had both the plastics and the machines to mass-produce plastic products.

Plastic was heralded as a cheap, efficient, versatile product that would transform the lives of all — and indeed it has.

2. Plastic, Uses and Abuses

In the late 1800's, plastic was heralded as a product that would relieve the demand for materials found in nature, such as ivory and tortoise shell, that were threatening these animals with extinction. Also, it was claimed that, as plastic was cheap, easy to produce and incredibly versatile, and virtually indestructible, it would allow access to material goods for the poor and middle class. However, it really wasn't until the 1940's that the plastic revolution really took off. Since then, about 8.3 billion tonnes have been produced; most has been thrown out. Landfills are stuffed. Oceans, and the animals in them, are choked. Plastic particles are even showing up in human placentas, with unknown health impacts.

It can be hard to really take in how plastic has become so ubiquitous that we aren't fully aware of it. I want to invite you to do a little exercise. Stand in the middle of your kitchen, turn slowly, and note the plastic you see in your environment. (It is helpful to do this on a piece of paper.) You might want to divide this into 3 categories: single use - e.g. food wrappings, multi-use - e.g. plastic containers you use more than once, and long-term use - e.g. door handles, floors. The plastic in our homes is a mirror for the plastic in our world — it is everywhere.

Although Canadians make up less than 0.5 percent of the global population, we use 1.4 percent, or almost 3 times the global average, of all plastic produced. This is an estimated 3.3 million tonnes per year, almost half of which is in the form of packaging. In Canada, more than one-third of our plastics are created for single-use products or packaging. According to the Canadian government, Canadians use almost 15 billion plastic bags every year and close to 57 million straws every day. Only 9% of this plastic is recycled with the remainder going into our landfills, waterways, oceans and air, in the form of particulate matter.

Most of today's plastics are derived from the refining of oil and natural gas. Low oil prices make it difficult for plastic recyclers, who must invest in expensive sorting and processing facilities, to compete against already established petrochemical manufacturers, whose facilities are well integrated with the oil and gas industry. It's cheaper to make plastic from so-called "virgin oil" and put the waste in landfills than it is to recycle old plastics into new products.

Plastic has been of enormous benefit to our species, promoting cleanliness in our health systems and preservation with our food. It has also encouraged a throw-away culture and heedless consumption, which doesn't take into account the cost to the environment, other life on this earth, and ultimately ourselves.

The big question is how could we possibly live without plastic and how can we possibly live with it?

3. Plastic Recycling on Mayne

Plastic really became part of our daily lives after World War II. According to Statistics Canada, Canadians produce a lot of plastic waste, an estimated 3.3 million tonnes per year with about 2.8 million tonnes of plastic waste ending up in landfills every year. In Canada, more than one-third of our plastics are created for single-use products or packaging. One of the solutions to this phenomenal waste problem is recycling.

So, let's look at what happens to the plastic that arrives at the recycling depot on Mayne. The depot is funded to recycle the packaging that comes from personal residences only, with the cost for non-packaging materials being borne by the depot.

When you arrive at the depot, a long line of containers for specific materials meets you. This may seem like a test, or maybe a bad joke, to see how well you remember what goes where. But it is a good cause, and who says you can't teach an old dog new tricks, so I start my sorting. First comes stretchy plastic versus crinkle plastic, which are in two separate containers side by side. Zip lock bags are a hybrid — if you cut the top zip off, it goes into the crinkle plastic while the rest of the bag can go into the stretchy one. Otherwise the whole bag goes into the crinkle container. And all that mylar plastic, the stuff with the silver side, goes into the crinkle container. The crinkle plastic is currently burned for fuel (displacing gas or oil), but research is ongoing to find other end uses. The clear stretchy plastic is remade into more stretchy plastic like garbage bags.

Next, on to the hard plastic. Your yogurt and various food containers, etc. go in the tote that also has the metal, and plastic milk cartons. This plastic will go on to Merlin Plastics in New Westminster, one of the premier plastic recyclers in the world. It is good to know that the plastic recycling is all done in B.C. and not shipped overseas. Plastic is sorted with an optical sorter into nine categories. Then it is cleaned, shredded and pelletized, and finally blended into the recipe necessary for the buyer. Plastic can be recycled approximately seven times.

Lastly you can drop off your plastic water and pop bottles in a separate tote where they will be returned for deposits. The depot actually makes a lot of money from these deposit containers and this goes to offset the costs for recycling those items that are not funded by other sources.

We are currently considering taking in more non-packaging plastic — that is things like toys and children's car seats, etc., probably on a donation basis. We will keep you posted on that, so regularly check our website www.maynerecycles.ca, always a good source of information.

While in B.C. our recycling is amongst the best in the world, locally done and paid for by the manufacturers, it is not the ultimate solution to plastic waste.

4. The Future of Plastics

Plastic, the wonder product, has really only come into use since the 1940's. Plastic is cheap, very long lasting, and incredibly versatile. These very qualities have created a major problem with disposal. The introduction of single-use plastics has enabled a throw away culture. We are polluting the ocean with around 12.7 million tons of plastic a year; the damage we are doing to marine life and our ecosystem is becoming irreparable. Plastic garbage is filling up our dumps with products that often take hundreds of years to decompose. Plastic bottles, for instance, are estimated to require approximately 450 years to decompose in a landfill. Even the air we breathe is filled with micro plastics.

Recycling is touted as the solution to this plastic pollution problem. However, in Canada, currently only 9% of the plastic used here is recycled. Also, plastic degrades in the recycling process, so on average, it can only be recycled 7 times.

To tackle the problem of plastic pollution will require a combined effort on the part of the government through legislation, industry through innovation and compliance with regulations, and the public by being aware, doing their part, and encouraging both the government and industry to quickly address this problem.

The Government of Canada in Oct. 2020 announced a plan to achieve zero plastic waste by 2030. A key part of the plan is a ban on harmful single-use plastic items where there is evidence that they are found in the environment, are often not recycled, and have readily available alternatives. Based on those criteria, the six items the Government proposed to ban are plastic checkout bags, straws, stir sticks, six-pack rings, cutlery and food ware made from hard-to-recycle plastics. This ban is supposed to come into effect by the end of this year, 2021. In May 12, 2021 the federal government announced the addition of plastic manufactured items as toxic under Schedule 1 of the Canadian Environmental Protection Act (CEPA).

Industry has been searching for and coming up with biodegradable alternatives to plastic. At the same time, petrochemical industries are aiming to to grow the consumption of single-use plastics by 30 % in the next 5 years. While many countries, like Canada, are placing bans on the use of certain types of single-use plastics, these bans do not extend outside national borders. Manufacturers are at liberty to sell these products where they are unregulated. There is a call for the manufacturers to be held responsible for the disposal of their plastics packaging wherever they are consumed.

As for the consumer, that's us, we have our part to play in dealing with plastics. Try to make wise choices, consider is it possible to use a better alternative? Carry reusable containers like coffee cups, water bottles, shopping bags, etc. And for all the plastic packaging that can be recycled, we will see you at the depot.

A good source of further information is Greenpeace Canada Plastics - https://www.greenpeace.org/canada/plastic